NAVAL POSTGRADUATE SCHOOL
Monterey, California

2.

THESIS

THE CAPACITY OF THE
NAVAL POSTGRADUATE SCHOOL
TO ABSORB ADDITIONAL
GRADUATE STUDENTS

by

Mark T. Timme

June, 1994

Thesis Co-Advisors: Shu S. Liao
Gregory G. Hildebrandt

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One important issue in past Base Realignment and Closure (BRAC) hearings has been excess capacity of bases. This thesis evaluated the ability of the Naval Postgraduate School (NPS) to absorb the average yearly number of students now attending the Air Force Institute of Technology (AFIT). Both schools' curricula were reviewed and a course comparison, designed to see if NPS can cover the same course material found in AFIT curricula, was conducted. It was found that NPS courses matched 92% of all AFIT courses for Masters students. NPS capacity was examined and found to be able to accommodate the average students on board at AFIT without requiring major construction for classroom space. Faculty requirements were examined and it was determined that approximately 93 additional faculty members would be required to effectively teach the courses required for an increase of 450 students. The analysis suggests that both schools, AFIT and NPS, discuss the possibility of consolidating both schools at one site.

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THE CAPACITY OF THE NAVAL POSTGRADUATE SCHOOL
TO ABSORB ADDITIONAL GRADUATE STUDENTS

by

Mark T. Timme
Lieutenant Commander, United States Navy
B.S., Marquette University, 1983

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Author: Mark T. Timme

Approved by: Shu S. Liao, Thesis Co-Advisor

Gregory G. Hildebrandt, Thesis Co-Advisor

David R. Whipple, Chairman
Department of Systems Management

ABSTRACT

One important issue in past Base Realignment and Closure (BRAC) hearings has been excess capacity of bases. This thesis evaluated the ability of the Naval Postgraduate School (NPS) to absorb the average yearly number of students now attending the Air Force Institute of Technology (AFIT). Both schools' curricula were reviewed and a course comparison, designed to see if NPS can cover the same course material found in AFIT curricula, was conducted. It was found that NPS courses matched 92% of all AFIT courses for Masters students. NPS capacity was examined and found to be able to accommodate the average students on board at AFIT without requiring major construction for classroom space. Faculty requirements were examined and it was determined that approximately 93 additional faculty members would be required to effectively teach the courses required for an increase of 450 students. The analysis suggests that both schools, AFIT and NPS, discuss the possibility of consolidating both schools at one site.

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I. INTRODUCTION

A. GENERAL ISSUE

> If, as Services we get too critical among ourselves, hunting for exact limiting lines in the shadow land of responsibility as between ... (the Services), hunting for and spending our time arguing about it, we will deserve the very fate we will get in war, which is defeat. We have got to be of one family, and it is more important today than it has ever been.[Ref.1]

In April of 1993 the United States General Accounting Office (GAO) published an Analysis of the Department of Defense's Recommendations and Selection Process for Closures and Realignments. In this report the GAO criticized the Office of the Secretary of Defense (OSD) for not looking at cross service opportunities for consolidation and cost savings. With the 1995 BRAC process beginning these same opportunities should not be dismissed due to Service parochialism.

Secretary of Defense William Perry, in a memorandum concerning the 1995 Base Realignments and Closures (BRAC), states:

> DoD Components and BRAC 95 Joint Cross-Service Groups should, where operationally and cost effective, strive to: retain in only one Service militarily unique capabilities used by two or more Services; consolidate workload across the Services to reduce capacity; and assign operational units from more than one service to a single base.[Ref. 8:p.4]

One area that was not mentioned in the memorandum but warrants looking into as an opportunity for potential consolidation is postgraduate education being taught at military institutions.

Currently the Air Force Institute of Technology (AFIT) and The Naval Postgraduate School (NPS) are the only military run postgraduate level institutions. Some Services do have postgraduate level programs in place at civilian institutions. One example is the financial management program the Army has established at Syracuse University. There are also programs whereby students attending one of the Service war colleges are able to obtain a Masters degree through a local university. All three Services also have programs whereby officers may be funded to attend approved civilian institutions to earn a Masters degree or Ph.D.

B. BACKGROUND

The idea of consolidating postgraduate education being taught at military institutions is not a new idea. In 1975 a major analysis was done by the Graduate Education Subcommittee of the Interservice Training Review Organization (ITRO) on the potential for consolidation of like programs between AFIT and NPS. This study was conducted during the military drawdown following the Vietnam conflict, a climate much like the drawdown occurring today in the post cold war era.

This analysis was followed by an updated report in 1978 which reviewed consolidation possibilities of five like

programs that were offered at both institutions. Table 1 lists those five programs. The 1978 report found that there would be large one-time costs associated with consolidating these programs at either AFIT or NPS. Also, the report stated that any annual cost savings from consolidation would be more than offset by the disruption and loss of responsiveness caused by consolidation. These and other findings will be dealt with in the analysis.

TABLE 1 - CURRICULA COMPARED AT AFIT AND NPS

NPS	AFIT
OPERATIONS RESEARCH/SYSTEMS ANALYSIS	OPERATIONS RESEARCH
COMPUTER SCIENCE	COMPUTER SYSTEMS
ENGINEERING ELECTRONICS COMMUNICATIONS ENGINEERING	ELECTRICAL ENGINEERING
AERONAUTICAL ENGINEERING AERONAUTICAL ENGINEERING - AVIONICS	AERONAUTICAL ENGINEERING
ACQUISITION AND CONTRACT MANAGEMENT	PROCUREMENT

In March of 1994 a report by the Under Secretary of Defense for Personnel and Readiness on the feasibility of consolidation of War and Staff colleges was completed. The report followed a November 9, 1993 conference report in which the U.S. Congress requested the Secretary of Defense look at:

> potential cost savings from consolidation of the military services command and staff, and war colleges, and the administration . . .. Consideration shall be given to the progress that has been made on joint- and service-specific education . . . also consider possible enhancements to joint education and training that may result from consolidation of these institutions, and a comparison of savings achieved through vertical integration of the administrations within each service, including instances where such integration has already occurred, ...

With regards to geographic consolidations the study found that each Service war college is Service specific in its approach to teaching classes in order to provide a solid foundation which can then be applied in command and staff college joint classes. It also found that geographic relocations were not economically feasible because of the long length of payback(greater than five years). This long payback time was attributed to investments in new construction required to handle the increase in personnel. It also stated that:

> Geographic relocation involves more than just the move of the primary academic buildings. It also involves the costs of moving various supporting organizations, which disrupts the cohesion of the educational institutions by reconstructing civilian faculty that may choose not to move, and impacts the infrastructures of the associated bases and local communities, as well as generating a ripple effect in regional economies.

In each of the instances that this study examined for possible consolidation it was assumed that no excess capacity existed at the consolidation site and therefore construction would be required.

C. PURPOSE STATEMENT

The purpose of this thesis is to judge the ability of the Naval Postgraduate School to absorb the average yearly number of students now attending the Air Force Institute of Technology.

D. RESEARCH OBJECTIVES

In examining a consolidation of AFIT programs at NPS the same type of questions that are asked of other interservice consolidation efforts can be asked here.

1. Does NPS have excess capacity to accommodate AFIT's student population(classroom, housing, etc.)?
2. Would additional faculty be required to handle this influx of students? If so, how many?
3. Are the facilities at NPS adequate to handle the additional research that would be expected from both the students and faculty brought to Monterey?
4. Can NPS establish individual programs to satisfy Air Force requirements that are currently being met at AFIT?
5. What are the cost implications for NPS from this consolidation?

E. SCOPE/LIMITATIONS

The main reason for looking at NPS capacity was ease of gathering information. Another reason was that NPS has

approximately 1700 students in its programs during the school year while AFIT has approximately 350 in its Masters programs and 100 in its Doctoral programs. One would think that the larger institution would be able to absorb the smaller institution much easier. This may not be the case but it was a presumption made in approaching this topic. The author is also expecting both schools enrollment figures to hold steady both during and after the ongoing drawdown. The assumption here being that the drawdown will require a higher percentage of those officers still serving to have a higher education in order to meet increased demands placed upon them. This assumption is consistent with NPS future enrollment numbers as shown in Exhibit 3-3.

An important area that will not be specifically analyzed is facility capacity at NPS for any lab equipment now at AFIT that is deemed unique and essential to instruction and ongoing research at AFIT. Instead, only excess capacity that already exists at NPS will be examined. Only those with technical expertise in the specific discipline can discern what, if any, equipment would have to be moved to NPS.

With regards to which instructors should come from AFIT to fill any increase in requirements, this thesis will only consider an overall number required at NPS to cover an increase of approximately 450 Masters and Ph.D. students that would move from AFIT. In comparing curricula between the two institutions, school catalogs, which listed required courses

for each degree and had descriptions for each course offered, were used. The course descriptions may not include the Air Force orientation/application which AFIT faculty may give the courses.

F. OVERVIEW

In approaching this topic one realizes that this is a sensitive issue for both the Navy and the Air Force. Both institutions are steeped in tradition and these schools serve a vital mission for both services in training their officer corps and in ongoing research. Why then, should consolidation be examined? It would seem that consolidating both schools would not only save money and fill up excess capacity at NPS but also help dramatically as the Services move towards jointness in many educational as well as military areas.

> This balanced mix ensures the rich, fully joint environment essential to developing understandings across service and department lines and to forming friendships among the men and women destined to be among America's leaders.[Ref.2:p.56]

There are more issues involved in a consolidation besides excess capacity and consolidation of like services. However, two of the major areas that have been focused on in recent BRAC hearings are those of excess capacity and duplication of services. Both of these areas would seem to apply in this case and will be the areas that this thesis will address.

II. CONSOLIDATION OVERVIEW: A LOOK AT AFIT AND NPS

In looking at consolidating programs between AFIT and NPS one first needs to understand how these institutions came into being and what their missions have evolved to today.

A. AIR FORCE INSTITUTE OF TECHNOLOGY

The Air Force Institute of Technology is located on Wright-Patterson Air Force Base in Dayton Ohio. It was established in 1919 as the Army's Air School of Applications. In 1950, command jurisdiction of AFIT shifted from Air Material Command to the Air University located at Maxwell AFB, Alabama. AFIT has evolved so that, at present, its mission is to "support the Air Force through graduate and professional education, research and consultation." [Ref.1:p.1]

> This mission requires that the Institute identify, conduct, and evaluate graduate and professional education which maintains the effectiveness of aerospace power as an instrument of United States policy. In other words, the Institute provides coordination between academic means and DoD ends by analyzing, comparing and matching higher education resources and Air Force educational requirements.[Ref.5:p.1]

AFIT postgraduate education is divided into two schools, The School of Engineering and the School of Logistics and Acquisition Management. Table 2-1 lists degrees offered at AFIT.

TABLE 2-1 - DEGREES OFFERED AT AFIT

School of Engineering	**School of Logistics and Acquisition Management**
Aeronautical Engineering*	Acquisition Logistics Mgt.
Astronautical Engineering*	Logistics Mgt.
Computer Engineering*	Maintenance Mgt.
Electrical Engineering*	Supply Mgt.
Engineering Physics*	Transportation Mgt.
Nuclear Engineering*	Contracting Mgt.
Systems Engineering*	Cost Analysis
Applied Mathematics	Information Resources Mgt.
Applied Physics	Systems Mgt.
Electro-Optics	Software Systems Mgt.
Engineering & Environmental Management	
Operational Analysis	
Operations Research	
Space Operations	
Doctor of Philosophy (Eng)	
Applied Mathematics	
Aeronautical Engineering	
Astronautical Engineering	
Electrical Engineering	
Computer Engineering	
Engineering Physics	
Nuclear Engineering	
Operations Research	

*ABET accredited degrees

> The Schcol of Engineering provides scientific and technological education in an Air Force research and development environment. The graduates of this school are assigned to widely ranging positions in a constantly changing technological environment. They must become not only practicing engineers but also broadly educated leaders capable of directing Air Force research and development programs.[Ref.1:p.25]

The School of Engineering is fortunate in that it is collocated with four major Air Force Aeronautical Laboratories with a combined budget of over one billion dollars. These facilities have been used without any accounting payment being charged to AFIT for both student and faculty research[Ref.3]. While one may say that AFIT is using idle time, there is an implicit opportunity cost to the laboratory by not contracting that excess capacity to another Air Force agency or civilian company.

> The School of Logistics and Acquisition is the "Air Force's graduate school of technical management." The school's mission is to deliver modern tools and techniques of management to Air Force and Department of Defense Customers. The school carries out its mission through research, consulting, and teaching in the graduate education formats.[Ref.1:p.145-6]

> AFIT is accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools. Appropriate engineering curricula are also accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology(ABET).[Ref.5:p.11]

In reviewing the 1993-1995 AFIT graduate catalog the number of faculty listed as instructors was 181. Of these, 91 were military with 77 of the 91 holding a Ph.D. Of the 90 civilian instructors 78 hold a Ph.D. Most faculty at AFIT are paid on a twelve month basis and are usually scheduled to

teach three quarters out of four each year[Ref.9]. While bringing in research dollars has not been emphasized in the past, AFIT is now moving towards paying its faculty on a ten month basis and requiring them to find research dollars to support the other two months[Ref.9].

B. NAVAL POSTGRADUATE SCHOOL

The Naval Postgraduate School is located in Monterey, California. It was established in 1909 and in 1947 Public Law 303, Title 10, U.S. Code established NPS as follows:

> Be it enacted by the Senate and House of Representatives that the Secretary of the Navy is hereby authorized to establish the United States Naval Postgraduate School for the advanced instruction and training of commissioned officers of the Regular Navy and Marine Corps and the reserve components thereof in the practical and theoretical duties of commissioned officers... NPS is authorized, upon due accreditation... to confer bachelors of science, masters, or doctors degrees... on qualified graduates.

NPS has evolved today as an institution whose mission is:

> To provide advanced professional studies at the graduate level for military officers and defense officials from all services and other nations. The school's focus is to increase the combat effectiveness of the armed forces of the United States by providing quality education which supports the unique needs of the defense establishment. [Ref.7:p.7]

This mission was expanded in 1986 via SECNAV INSTRUCTION 1524, May 23, 1986:

> The Naval Postgraduate School exists for the sole purpose of increasing the combat effectiveness of the Navy and Marine Corps. It accomplishes this by providing post-baccalaureate degree and nondegree programs in a variety of subspeciality areas not available through other educational institutions. NPS also supports the Department of Navy through the continuing programs of naval and maritime research and through the maintenance of an expert faculty capable of working in, or as advisors to, operational commands, laboratories, systems commands, and headquarters activities of the Navy and Marine Corps. [Ref.7:p.7]

In keeping with this mission one of the functions of NPS is to:

> Educate, as CNO may direct, commissioned U.S. Naval officers to the level essential for professional performance in validated billets in the Navy's subspecialty system. Educate other authorized U.S. and allied military officers consistent with the requirements of the individual services, Department of Defense (DoD), and foreign governments, within available resources. Educate civilian personnel within the U.S. Government consistent with their sponsoring organizational needs and within available resources.[Ref.10]

NPS is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges. Engineering curricula accredited by Accrediting Board for Engineering and Technology (ABET) are Aeronautical, Electrical and Mechanical. The Systems Management Curricula is accredited by the National Association of schools of Public Affairs and Administration. Table 2-2 lists the degrees offered by the Naval Postgraduate School.

TABLE 2-2 - DEGREES OFFERED BY NPS

MASTER OF SCIENCE DEGREES	**DOCTOR of PHILOSOPHY**
Aeronautical Engineering*	Aeronautical Engineering
Applied Mathematics	Computer Science
Astronautical Engineering*	Elect & Cmptr Engineering
Computer Science	Engineering Acoustics
Electrical Engineering*	Mathematics
Engineering Acoustics	Mechanical Engineering
Engineering Science	Meteorology
Management	Operations Research
Mathematics	Physical Oceanography
Mechanical Engineering*	Physics
Meteorology	Systems Management
Meteorology and Physical Oceanography	
National Security Affairs	**DOCTOR OF ENGINEERING**
Operations Research	Aeronautical Engineering
Physical Oceancgraphy	Electrical and Computer Engineering
Physics	Mechanical Engineering
Systems Technology	
Systems Engineering	
Information Technology Management	
Engineer Degrees[1]	
Aeronautical Engineer	
Astronautical Engineer	
Electrical Engineer	
Mechanical Engineer	

* ABET accredited degrees
[1] Typically requires one year beyond the Master's Degree.

In the 1993 NPS graduate catalog there are 404 professors listed with 53 military(four with a Ph.D.), and 351 civilian(326 with a Ph.D.). These numbers are compared with AFIT's in Table 2-3. As the table shows AFIT has more military instructors than NPS has. Also a much higher percentage of AFIT's military instructors have a Ph.D. This fact reflects the Air Force's commitment to higher education of it's non-rated officer corps. These instructors bring not only their educational background into their teaching but also their military experience and expertise.

Table 2-3 - AFIT FACULTY vs NPS FACULTY

	AFIT	**NPS**
Total military #/%	91/50%	30/8%
- with Ph.D #/%	77/85%	4/13%
Total Civilian #/%	90/50%	351/92%
- with Ph.D #/%	78/86%	326/93%
Total Professors #	181	381
- with Ph.D #/%	155/86%	330/87%
Student population	457	1810
Stud/Faculty Ratio	2.5:1	4.8:1

C. AFIT vs NPS

In trying to compare various curricula offered at AFIT and NPS, it is imperative that one look at the style of education used. Both schools employ a somewhat different education style. The AFIT approach is rooted in the idea that an officer graduating from AFIT will remain in his/her area of expertise throughout the rest of his/her career in the Air Force. This is then reflected in a course of study that primarily covers only the specific field. This could be characterized as a more narrow focus on developing a specific set of tools. Students at AFIT rarely take up a course of study that is outside the area of their bachelors degree. As an example students enrolling in the aeronautical engineering curriculum must have an undergraduate degree in aeronautical, astronautical, mechanical or systems engineering.

Also, at AFIT less than five percent of the student enrollment is made up of rated, or warfare designated, officers[Ref.9]. This same percentage is carried forward into the civilian institution program. It is not unusual for a rated officer to complete his/her career without obtaining a graduate degree. This goes back to the Air Force philosophy that rated officers need to be accomplished in their mission area and that a graduate degree will provide a smaller benefit to the Air Force in terms of enhanced war fighting capabilities than the high cost of providing rated officers

with this education. It should be noted that approximately twenty percent the Air Force's Officer corps is rated and eighty percent non-rated[Ref.9].

The NPS approach is based on the belief that throughout a Naval Officer's career, especially senior tour assignments, unrestricted and restricted officers will work in various fields. NPS, therefore, offers a more broad-based education giving its officers a wider base of knowledge to draw upon in future tours. It is also the Navy's view that a graduate degree will only add more to an unrestricted officer's ability in his/her warfare specialty. This is reflected at NPS more than 70% of its students being unrestricted, or warfare designated, officers. This percentage is in line with the overall Navy ratio of unrestricted to restricted officers.

Differences in teaching philosophy between the two schools reflect not only in courses taught but in the length of time students spend earning their masters or Ph.D degrees. The average program length at AFIT is 18 months while the average course length at NPS is 21 months. AFIT does, however, teach one month of refresher courses which is not included in its average time on board.

One reason for the difference in the average length of the two schools' programs is that NPS offers a more broad-based education. Another reason is that NPS students are not limited to any one field based upon their bachelors degree. Most students at NPS take refresher classes because they are

entering a different field than their bachelors degree or have been out of college for at least four years. These classes can last from three months for a student entering an area of study comparable to their undergraduate degree to one year for a student from a non-engineering background entering an engineering field. The time between when an Air Force Officer graduates from college and enters a postgraduate school is shorter than the typical NPS student[Ref.9].

D. CONSOLIDATION

The joint task group that examined consolidation of specific classes in 1978 felt that moving a curriculum from one school to another did not eliminate the need for all classes taught leading to that degree. An example would be the physics and computer science classes needed for a degree in electrical engineering(EE) at AFIT. Even though the requirement for these classes to be taught to EE majors would be gone, they could be found in other curricula which also require them. Thus while one may eliminate some teaching positions associated with an EE major, all positions cannot be eliminated.

Another issue of consolidation is control over one Service's students in a school run by another service. Right now both schools are able to set up individual curricula to meet its service's needs. The question arises as to what control, if any, the Air Force would have over its students

and the programs they are enrolled in if they were to attend NPS.

E. SUMMARY

When looking at the programs set up at both AFIT and NPS one can draw some common conclusions about both institutions. Both Services started these schools out of a need for specialized training that was not available through civilian institutions. Both schools are able to tailor their curricula to meet their individual needs and are also able to make changes as each sees fit in order to meet a changing world environment. Yet, while both schools have individualized programs, there are enough similarities between the two schools to warrant looking at consolidating and thus looking at NPS capacity.

III. METHODOLOGY

In trying to determine if NPS has excess capacity sufficient enough to absorb AFIT's student population one would: (1)identify the likely number of students involved; (2)examine individual courses taught for each degree at AFIT and see if a match can be found at NPS; (3)determine what the classroom/laboratory/housing capacity of NPS is and if there is enough excess whereby additional construction would not be required and; (4)discern if any additional faculty will be required to accommodate the influx of students.

A. IDENTIFY AFIT AND NPS INPUTS

AFIT enrollment as of 1 April 1994 is shown in Exhibit 3-1. AFIT student population is concentrated heavily in its Engineering School. Not only does it have almost twice as many enrolled in its Engineering School masters program than the School of Logistics and Acquisition Management, but 100% of all Doctoral Students are enrolled in the Engineering School. While the number of students attending AFIT masters level programs has declined in recent years, AFIT has made up for this decline with a 33% increase in Doctoral students. Because the average time onboard of an Engineering Doctoral student is three years the average number of students onboard

has shown only a slight decrease. AFIT is expecting current enrollment numbers to remain the same for the June 1994 class starting date. While this figure is expected to remain steady for the near term there are no projections past the June 1994 class. The Air Force reviews its requirements yearly for Masters and Doctoral student graduates. This enrollment figure is published in September of each year for the following year[Ref.6].

EXHIBIT 3-1 AFIT ENROLLMENT 1 APRIL 1994

Graduate School of Engineering	
Masters Program	**# Students**
Astronautical Engineering	12
Aeronautical Engineering	32
Applied Physics	11
Computer Engineering	7
Computer Systems	31
Electrical Engineering	42
Engineering & Environmental Management	35
Electro-Optics	10
Operations Research	20
Systems Engineering	7
Space Operations	15
Strategic & Tactical Sciences	10
Subtotal	**232**
Doctoral Studies	**98**

Graduate School of Logistics and Acquisition Management	
Masters Programs	**# Students**
Acquisition Logistics	18
Cost Analysis	12
Contracting Management	13
Supply Management	6
Information Resource Management	13
Logistics Management	26
Maintenance Management	8
Systems Management	17
Software Systems Management	5
Transportation Management	6
Subtotal	**127**
Total Masters	**359**
Total Ph.D	**98**
Total Students	**457**

NPS enrollment as of 1 April 1994 is shown in Exhibit 3-2. The NPS enrollment is not concentrated heavily in any one area of study. And, while AFIT has shown a decrease in its enrollment of Masters level students, NPS will be able to maintain a stable student population. NPS has accomplished this by increasing the number of Marine Corps and International students to offset the decrease in Navy Officers. The student average-on-board(AOB) projections up through 1998 are listed in Exhibit 3-3.

EXHIBIT 3-2 NPS ENROLLMENT 1 APRIL 1994

NPS INDIVIDUAL MASTERS PROGRAMS	**# Students**
Operations Analysis	145
Operational Logistics	25
Command, Control & Communications	50
Space Systems Operations	45
Computer Science	120
Information Technology Management	156
Meteorology	3
Air-Ocean Sciences	41
Operational Oceanography	18
Advanced Science(Applied Mathematics)	20
Oceanography	9
Undersea Warfare	27
Underwater Acoustics	21
Combat Systems Sciences and Technology	78
Engineering Science(Refresher Students 1-2 Qtrs)	112
Naval/Mechanical Engineering	106
Electronic Systems Engineering	123
Space Systems Engineering	75
Electronic Warfare Systems Engineering	19
Electronic Warfare Systems for Allied Officers	10
Communications Engineering	13
Aeronautical Engineering	56
Aeronautical Engineering-Avionics	36
National Security Affairs(Middle East, Africa, South Africa)	28
National Security Affairs(Far East, Southeast Asia, Pacific)	15
National Security Affairs(Western Hemisphere)	10

National Security Affairs(Russia, Europe, Central Asia)	26
National Security Affairs(Strategic Planning)	36
National Security Affairs(Special Operations/Low Intensity Conflict)	22
Transportation Logistics Management	10
Transportation Management	15
Acquisition & Contract Management	42
Systems Acquisition Management	66
Systems Acquisition Management for Allied Officers, DoD civilians, USA, USMC, and USCG	27
Systems Inventory Management	6
Resource Planning/Management for International Defense	31
Intelligence	17
Material Logistics Support Management	46
Financial Management	64
Manpower, Personnel & Training Analysis	46
Total Masters Students	**1815**

EXHIBIT 3-3 NPS AOB PROJECTIONS 1994-1998

STUDENT AOB PROJECTIONS

	94	**95**	**96**	**97**	**98**
DON:					
NAVY	1158	1120	1102	1125	1125
MARINE	114	140	140	140	140
SUB TOTAL	1272	1260	1242	1265	1265
OTHER SERVICE:					
ARMY	202	179	179	179	179
AIR FORCE	36	32	32	32	32
USCG/NOAA/CIV	38	31	31	31	31
SUB TOTAL	276	242	242	242	242
INTERNATIONAL	232	225	225	225	225
TOTAL	**1780**	**1727**	**1709**	**1732**	**1732**

B. AFIT vs NPS COURSE COMPARISON

While it has been stated that AFIT and NPS both have different approaches to their Masters programs, both schools' curricula are accredited. Therefore, one would think that

comparable programs taught at both schools would have similar courses in their make-up. This theory lends itself to NPS more easily offering the same classes as AFIT than vice versa because NPS offers more courses for each of its degree programs than AFIT. The question thus arises as to whether the same course of study being taught at AFIT can be taught at NPS. In order to answer this question one must know what classes are taught at each institution and also have course descriptions for each class.

The AFIT catalog for 1993-1995 lists masters degrees offered and class requirements, with descriptions, needed for those degrees. The NPS catalog for 1994 lists masters degrees offered and class requirements, with descriptions, needed for those degrees. Utilizing these catalogs the author has interviewed professors at NPS in areas related to AFIT degree programs to determine if NPS can match class offerings at AFIT. What one would hope to accomplish by doing this is to find out not only what classes are duplicated between the two school but also what new classes may have to be created in order to fulfill Air Force requirements for its Masters Students. Appendix A lists course requirements for particular AFIT degrees and the NPS courses, if any, that are equivalent in course description.

In attempting to match up courses it was discovered that some courses taught at AFIT are being taught in two separate classes at NPS. This reflects the greater emphasis NPS has

put on the specific topics being covered. There were also instances where topics taught in two separate classes at AFIT are being covered in a single class at NPS. This reflects the greater emphasis that AFIT has placed on the specific topics being covered. Therefore, in Appendix A, some AFIT classes will have two NPS equivalent courses and different AFIT classes may have the same NPS equivalent course. The purpose was to see if NPS could cover the same material that was being covered at AFIT.

C. IDENTIFY EXCESS CAPACITY OF NPS

1. Classroom Availability

In identifying excess capacity at NPS one must first look at classroom availability, size and utilization. This was accomplished by examining the NPS Scheduler's list of classrooms available for the spring 1994 quarter. The author has assumed this availability to be representative of classroom availability for all quarters. This can be assumed because NPS staggers its enrollment dates throughout the year to maintain a stable student population.

Each classroom has a listed student capacity and the number of hours utilized during a 45 hour availability period(five days @ nine hours available each day). One realizes that it is possible to increase each rooms available hours to include night-time or weekend classes, but this study has attempted to fit AFIT students into the existing day-time

classroom schedule. While some classrooms can hold more than thirty students, the scheduler tries to limit class size to thirty students maximum. This will affect the average size of the available classrooms.

Most courses taught at NPS are four credit courses meaning that they meet for four fifty minute periods each week during the quarter. Therefore the total number of classrooms available for different courses would be nine periods per day times the number of classrooms available for use. There are currently sixty two available out of seventy three classrooms. This means that there are 558 classroom slots available for different courses. Some departments schedule their courses to meet for one period four times per week. Other departments schedule their courses to meet two periods back-to-back twice per week. In determining the number of extra courses which can be scheduled in each classroom at NPS the author has matched available time periods against the type of courses scheduled in that classroom(four times per week or two times per week).

If one can base the number of classrooms required as a percentage of students, it would follow that this percentage, if applied to the total population of NPS and AFIT, would yield the total number of classrooms required. If one then subtracts the number of classrooms actually scheduled in the spring quarter from the total required one would be

left with the incremental classroom requirement. The results are listed in Appendix B.

2. Laboratory Availability

Currently there are approximately 140 laboratories being utilized for regularly scheduled courses. Of these, 48 are scheduled by the NPS Scheduler and the rest are scheduled by the individual departments.

Each laboratory facility at NPS has its own unique scheduling requirements which affect its availability. While some labs could be changed between periods to suit different class requirements, others might required an hour between different lab set-ups. Other labs were limited by the fact that only one set-up could be accomplished per day. All these factors were taken into account to find lab availability. This number may not be a very reliable number because this thesis looked at one quarter's data and some labs may be utilized heavily in one quarter and sparingly the next. The results of laboratory availability are listed in Appendix C.

NPS also conducts academic research and RDT&E in its laboratory facilities. These areas are considered seperate from the student labs used for course instruction. The fact that NPS does conduct much of its research on site has allowed labs to acquire other pieces of equipment which add to their total capability.

There are difficulties in trying to arrive at a figure of significance with regards to excess capacity of labs. One can, for the most part, determine if excess capacity exists in classrooms and how many extra courses or sections can be taught. Each lab,however, is unique in its equipment and scheduling capabilities. NPS is in the process of conducting its own survey in which each department will individually assess the utilization and capacity of labs under their cognizance.

While it was not possible to conduct a viable comparison of laboratory facilities between AFIT and NPS some data was available on NPS laboratories and facilities. Exhibit 3-4 is a partial listing of military relevant laboratories and facilities utilized by various departments at NPS. While this list is not comprehensive it's purpose is to show the extent of NPS labs' capabilities and materials.

Exhibit 3-4 NPS LABORATORIES AND FACILITIES

General Facilities:

Classified Reports Library
Secure Compartmentalized Information Facility
Point Sur IUSS array
Research vessel "Pt. Sur"
Secure Computing and Simulation Lab

Aeronautics and Astronautics Department:

NASA computational fluid dynamics, NASA/NPS joint institute
High angle of attack aerodynamics
Solid propellant laboratory
Composite aging laboratory

Electrical and Computer Engineering Department:

Search radars: UPS-1, SPS-12, SPS-40C, SPS-67
MK-25 tracking radar
PPS-6 anti-personnel radar
SLQ-32 EW receiver
ECM systems: ALQ-X, ULQ-6B, DLQ-3, WLR-1G
SIGINT lab
Captured equipment analysis
WARP real time target detection and identification array
Fiber-optic signal processing
Transient electro-magnetic scattering lab
HARPOON seeker

Mechanical Engineering Department:

Sea Wolf swirler model
Underwater vehicle test facility
Sea Wolf scale model for hydrodynamic testing

Meteorology Department:

Tactical Environmental Support System
Wind profiler(coastal zone)
Navy Ocean Data Display System
Interactive Digital Environmental Analysis lab

Oceanography Department:

Tactical Oceanography lab
MOSS Navy mobile support system
SMQ-11 satellite receiver

Physics Department:

Infrared Search and Track engineering development model
Charged particle beam diagnostics
Atmospheric optical propagation characterization system
Submarine sonar transducer performance diagnostics
Submarine fibre-optic hydrophone design lab

Space Systems Academic Group:

Complete FLTSATCOM including test and control equipment
Telemetry, tracking, and control data link for FLTSATCOM to Naval Space Operations Center, Pt Mugu
TRANSIT satellite
Satellite test facility
EMI/EMC test facility
Space qualified ferroelectric memory experiment
Space Qualified ultraviolet ionospheric spectrometer
Thermo-acoustic cooler for space based sensors

3. Housing Availability

In determining available housing one must look at military housing first and civilian housing, if needed, second. With the recent closing of the Fort Ord Army base in the adjacent city of Seaside, NPS has become the sole custodian for housing units located on the Monterey peninsula. The housing areas include the NPS La Mesa housing area, Fort Ord housing area and the Presidio of Monterey, site of the Army's Defense Language Institute, housing area. The breakdown of available housing units is listed in Exhibit 3-5.

EXHIBIT 3-5 MONTEREY PENINSULA MILITARY HOUSING UNITS

Housing Area	Total Units
NPS	877
Fort Ord	1588
Presidio	93
	2558

While this is the total amount of available military housing on the Monterey peninsula all of it is not available for NPS students. Currently only the 800 NPS units and 600 of the 1588 Fort Ord units are available for NPS use. However, 130 units of the 600 NPS units at Fort Ord are designated as enlisted housing. Housing availability for NPS students was based on the number of units available and requirements to keep a certain number of units available for other commands on the peninsula. These other commands include the Coast Guard,

students at the Defense Language Institute and Army personnel that are still at Fort Ord.

Of the 1800 students attending NPS approximately 67% are married and require family housing, either military or civilian. This constitutes a requirement for approximately 1206 units(military or civilian). If these same percentages were to hold true for an additional 450 students, there would be a total requirement for 1507 units, with 302 being new requirements. Of the 2558 units available there are currently 1347 set aside for NPS students and Officer staff.

There are currently 41 permanent rooms available at the NPS BOQ for single students. At La Mesa housing there are 20 units in the process of being made available for 60 geographic bachelors. If one assumes that 67% of the NPS students are married requiring family housing than 33% should require bachelor housing. In applying this figure to the 450 additional students a new requirement for 149 single students would exist.

Those that are not able to acquire government quarters would be required to find housing in the local communities. The local area housing statistics are listed in Exhibit 3-6. The vacancy rates account for a total of 3561 units available.

EXHIBIT 3-6 VACANCY RATES FOR CITIES WITHIN 20 MILES OF NPS

City	------Single------ Detached	Attached	---Multiple--- 2 to 4	5 plus	Total	% Vacant
Carmel	2824	82	167	299	3372	6.00
Del Rey Oaks	568	29	24	112	733	5.05
Marina	3181	1412	1295	2107	7995	15.00
Monterey	5663	1102	2165	4735	13665	6.47
Pacific Grove	4827	511	975	1630	7943	7.48
Seaside	6178	2069	1046	1461	10754	6.00

D. FACULTY REQUIREMENTS

While there are 381 faculty members at NPS, they do not teach year round. NPS, on the average, has maintained a teaching to research ratio for its professors of 60 to 40 percent. This would leave the school with approximately 229 equivalent full time professors available to teach year round. While NPS pays all 381 professors, in actuality it only is paying for 229 equivalent full time professors. The 40 percent of the year spent conducting research is paid with reimbursable dollars.

Having 229 full time professors would put the student to faculty ratio at eight to one. One can apply this eight to one ratio to the increase of approximately 450 students to yield 56 extra full time faculty required. If the faculty averages 60 percent teaching and forty percent conducting research, then 93 additional faculty would be required to

accommodate the additional 450 students. Again, funding requirements would only be for 56 equivalent full time professors due to the availability of reimbursable research.

This thesis does not address the validity of maintaining an eight to one student/faculty ratio. If this ratio were increased, the requirement for 93 new faculty members would decrease and, correspondingly, the funding requirement for 56 equivalent full time faculty members would also decrease.

IV. ANALYSIS

A. AFIT AND NPS INPUTS

It is clear from the examination of both AFIT and NPS that both the Navy and the Air Force have a strong interest in their respective postgraduate schools. The Navy has committed itself to sending a higher percentage of its officers to NPS for Masters degrees than the Air Force sends to AFIT in residence. This commitment is also reflected in the offering of a wider variety of degrees at NPS. In addition to those curriculum that offer like degrees as AFIT, NPS has courses of study in National Security Affairs, Air-Ocean Sciences, Combat Systems Sciences and Technology, Joint Command, Control and Communications, Naval Engineering and, Undersea, Space and Electronic Warfare. The Air Force does send a larger contingent of officers to AFIT in the Doctoral program then the Navy sends to NPS for a Ph.D. This reflects the Air Force assessment of the importance of a doctoral education for its non-rated officers.

An important point left out in these enrollment numbers is the fact that while NPS can project what its enrollment numbers may be, no one can be sure that these projections will actually match reality. In an age of a shrinking military and

officer corps, it may be decided, for example, that instead of maintaining a stable population at NPS or AFIT, the number of students enrolling at both schools should be the same percentage of the overall officer end strength as is the case today. If this is the case than both schools may see a decline in enrollment and an increase in excess capacity.

AFIT has recently formed a consortium with two neighboring institutions, Wright State University and The University of Dayton. Students attending any of the three schools may take courses from one of the other schools which can be applied towards their degree requirements[Ref.6]. This consortium, called DAGSI (Dayton Area Graduate Studies Institute), is awaiting pending legislation to allow AFIT to fully participate in this project. NPS is also moving towards similar agreements with local institutions to allow for joint educational usage.

B. AFIT vs NPS COURSE COMPARISON

Of the twenty one programs offered at AFIT that are listed in Appendix A only Engineering and Environmental Management, and the Nuclear Engineering subspeciality of Physics are programs that would need a majority of their classes added to those already being taught at NPS in order to fulfill their requirements. In the case of Environmental Management this amounted to six new classes and a symposium. Nuclear Engineering also would require six new classes. All other

courses combined had 95 percent of classes that could be matched(Exhibit 4-1). This is a significant percentage given that the two schools were set up to provide unique courses for their respective services. It would seem that there is more duplication of services than past studies would have lead one to believe.

Again, this study looked at matching AFIT courses with NPS courses and not vice versa. NPS offers, on the average, more courses per degree and more unique degrees than AFIT. It is therefore unlikely that AFIT would be able to match the same percentage of courses taught at NPS than NPS can of those courses taught at AFIT.

In almost all cases where courses did not match, with the exception of the Environmental Management and Nuclear Engineering curricula, it was judged, by those professors interviewed, that adding courses to cover these areas would not require any major shift in course focus or significant budget items for developing a new course. Of course, if the two schools were to merge, professors with expertise and a course already in place at AFIT could start up a new course at NPS in minimal time.

An important point that was brought up in interviews with most NPS professors in comparing courses was that AFIT curriculum are structured so as to produce a graduate that specializes in one area. NPS curriculum offer a broader range of classes. Therefore, if NPS and AFIT were to consolidate,

the requirement for Air Force Officers to specialize would not go away. If the same AFIT course requirements were offered at NPS than former AFIT students would have a wider variety of classes with which to choose from in specializing. NPS students would also be able to take more specialized classes that would be offered as a result of Air Force requirements.

EXHIBIT 4-1 TOTAL NUMBER OF COURSES COMPARED AND MATCHED WITH AN EQUIVALENT NPS COURSE(S) FOR EACH DEGREE OFFERED AT AFIT

AFIT Program	Courses Compared	Courses Matched
Acquisition Logistics Management	18	18
Aeronautical Engineering	49	48
Astronautical Engineering	41	40
Computer Engineering / Computer Systems	38	35
Contracting Management	18	18
Cost Analysis	20	19
Electrical Engineering	71	65
Environmental Engineering	11	5[1]
Information Resource Management	23	22
Logistics Management	20	20
Applied Mathematics	14	14
Maintenance Management	21	20
Operational Analysis	16	16
Operations Research	15	14
Applied Physics	30	21[2]
Software Systems Management	21	20

Space Operations	16	16
Supply Management	19	19
Systems Engineering	30	24[3]
Systems Management	17	17
Transportation Management	18	18
Total Courses Compared/Matched	**491**	**454**

[1]No match for 6 ENVR courses
[2]No match for 6 NENG courses
[3]No match for 3 ENVR courses

Can one discern from these figures exactly how many extra sections of like courses would be required or how many new courses would be needed? The number of extra sections or new courses would depend on how a consolidation would take place. There are two basic scenarios for consolidation. The first is that all AFIT students transfer to NPS at the same time, regardless of how far they had progressed in their curriculum. The other is that all students already enrolled at AFIT be allowed to finish their degree there, and all new students begin their program at NPS.

The process of determining how many new courses would be required for each scenario would be the same. One would have to first decide which courses would be required for the transferring AFIT students and substitute the NPS course that matches the course for content. Unless course requirements for Air Force students were to change following a consolidation, any courses that couldn't be matched would

require a new course and a certain number of sections, depending on the total number of students required to take the course.

If only new students were sent to NPS and existing AFIT students were allowed to complete their education at AFIT the process would be the same. However, the initial number of new courses a sections required for all courses would be smaller, and would then build up gradually as more students enrolled.

The courses that would be offered for Ph.D. students were not compared in this thesis. Presumably, there would be a need for an increase in courses offered at NPS to accommodate the Ph.D. students from AFIT. These courses would also be available for select Masters students who had demonstrated superior performance in their respective field of endeavor.

C. EXCESS CAPACITY OF NPS

1. Classroom Availability

In reviewing Appendix B it appears that there is ample classroom space available at NPS to absorb 450 more students. This can be accomplished without having to schedule courses after the nine daily classroom scheduling periods. With approximately 200 extra scheduling periods available, being able to schedule 88 additional courses should not pose too great a problem. In scheduling the 1800 current students at NPS there are approximately 960 different student schedules

that need to be meshed into a nine period day, five day week. This process is being accomplished by two schedulers who work the last eight weeks of each quarter just to schedule the following quarter's classes.

Various scheduling problems exist. Students who have deviated from their curriculum schedule, either through validating classes and moving later classes forward, or having to retake a dropped class, or taking different electives, require unique schedules. A solution to this problem may be to only schedule students for their core courses and have them sign up separately for their electives or any other core courses which they may be taking early. This solution has its own problems in that students are at NPS for a set amount of time. Their respective Services cannot afford to have their time at NPS extended because they weren't able to schedule all of their courses. There are also certain blocks of time each week which must be set aside for Superintendent Guest Lecturers and other student/faculty meetings.

NPS has tried to develop a computer program whereby all one would have to do is input students schedules, classrooms available for instruction, and any professor preferences and the computer automatically formulates the next quarter's schedule. The scheduling, however, continues to be a manual process as a workable program has yet to be developed.

2. Laboratory Availability

As was stated in chapter 3 it was not possible for the author to match up labs between AFIT and NPS. This is an area that those with experience in each of the lab areas must examine by comparing both schools' facilities. It can be concluded that the labs at NPS have sufficient capacity to accommodate a large proportion of the AFIT students. While the spring quarter's data may not be indicative of average laboratory usage, the scheduling of classes with lab requirements could be adjusted to allow for an even usage of labs each quarter given the increase from a consolidation.

While AFIT does have Air Force Aerospace laboratory facilities that it uses for both student and faculty research, these do not appear to be essential requirements for obtaining a masters degree. The same degree can be earned without these labs although they do make it easier for students to conduct thesis research. This same experience may be gathered by sending Air Force students to these labs for six week experience tours as is done with NPS students in various curricula now.

3. Housing Availability

Housing 450 additional students and their families, if any, does not seem to be as great an issue with the closing of Fort Ord and NPS taking control of an additional 600 units, 470 of which will be available for NPS staff and students.

Having 1347 units available for approximately 1507 student families gives a coverage percentage of 89%. This is assuming that all those families would be requesting military housing. While it was stated that the percentage of people attending NPS who opted to live off base was not available, given this fact, the number of families requiring military housing would be less and the coverage factor higher.

As of January 1994 there were 3541 vacant units within a twenty mile radius of NPS and approximately 11,400 in all of Monterey County. A breakdown, however, wasn't available as to whether these units were apartments, condominiums or attached/detached homes. One would expect a fairly even split between them. Therefore, any student families should be able to find adequate housing be it military or civilian.

Currently there is a lack of space to accommodate all bachelors attending NPS who want to live in military housing. The Bachelor Officer's Quarters, located in Hermann Hall, is planning that within two to three years the Naval Aviation Safety School may move to other quarters at NPS. This move would free up two floors of Hermann Hall for more rooms. Currently, with only 41 rooms available, a large percentage of bachelors and geographic bachelors must reside off base.

D. FACULTY REQUIREMENTS

As indicated in Chapter III, approximately 93 new faculty positions would have to be created if AFIT students were

consolidated with NPS students. Yet, funding requirements were only needed to cover 56 full time professors as reimbursable funds could be expected to cover the other forty percent of their time spent conducting research. This is not to say that only 93 of AFIT's faculty would transfer to NPS. Obviously in a consolidation of this type an oversight committee would have to weigh course requirements for all students attending this "Defense Postgraduate School." From this analysis, faculty requirements would then be determined. Clearly, all available professors from both schools would be considered when forming a combined faculty.

The benefits of such a combined faculty would be tremendous not only for the military Services but for the entire Department of Defense. With the combined capabilities of both Engineering schools it may be easier to move towards uniformity in engineering standards for all Services. Joint research could also move the Services towards uniformity in areas like DoD accounting standards, computer standards, distance learning standards, and countless areas in weapons systems standards.

In researching this topic it was surprising to find out just how little these two schools' faculty interact with each other on a regular basis. There are one or two professors the author encountered that do interact regularly. But, on the whole, both schools have had too few joint academic projects. This may be due to both schools having different program

sponsors with different agendas for their programs. Both Services still have their own service specific way of conducting various operations which could be the main reason that there hasn't been many opportunities presented that would require joint participation of the two schools. A consolidated university would solve this problem.

In a consolidation there will probably be those professors who, for various reasons, would opt not to move if it was required of them. One would hope that the opportunities presented by a consolidation of these two schools would outweigh any reservations one would have towards such a consolidation. The bottom line is to provide the men and women of the U.S. Armed Services, DoD employees and International students the best possible education.

E. OTHER STUDIES

The other studies which analyzed the idea of consolidation, the 1978 study comparing AFIT and NPS programs and the 1994 study which looked at Consolidation of War and Staff colleges, bear mentioning. The 1978 ITRO study never considered the possibility of a total consolidation at either site. In consolidating only certain curricula the study found that, because of the interdisciplinary nature of the curricula examined, most courses would still need to be taught for curricula not consolidated. With a total consolidation this problem would cease to exist.

The 1978 study did little in the way of examining any real cost savings. If a total consolidation were to take effect, savings could occur in areas such as support staff, decreased maintenance costs for AFIT school and laboratory facilities, overhead costs with respect to lighting, heating, etc., and savings in faculty salaries.

The 1994 study, which considered consolidating various War and Staff colleges, determined that construction would be required in each instance to accommodate the increase in students, faculty, staff and other support personnel. Because of this lack of space, construction costs would not be recouped by any savings within the five year time period required by this study. One purpose of this thesis was to determine if NPS would require any major construction. This thesis did not find any requirement for major construction, thus eliminating the major cost found in other consolidation studies.

V. CONCLUSIONS

A. INTRODUCTION

Chapter I lists five questions that were the research objectives of this thesis. This chapter will revisit those questions to see what answers were found and what new questions were raised.

B. RESEARCH OBJECTIVES

1. Does NPS have excess capacity to accommodate AFIT's student population(classroom, housing, etc.)?

It would appear that there is ample capacity to accommodate the student population of AFIT at NPS. Classroom usage would indicate that any additional course requirements could be handled without having to undergo new construction. Enough housing now exists, with the acquisition of Fort Ord housing, to accommodate the families of students and military instructors that would come from AFIT. While ample government bachelor quarters do not exist to house all or a high percentage of bachelors that would be involved in a consolidation, enough off base housing exists to accommodate the increase.

2. Would additional faculty be required to handle this influx of students? If so, how many?

Additional faculty would be required to adequately instruct the influx of Masters and Ph.D. students a consolidation would bring. This research placed that number at 93 more faculty members that would be required in order to have 56 full-time equivalent teaching faculty members. A consolidation would require that an oversight committee look at all available instructors between the two schools, and any other qualified applicants, in order to achieve the total required number of faculty.

3. Are the facilities at NPS adequate to handle the additional research that would be expected from both the students and faculty brought to Monterey?

It is likely that the facilities at NPS and the surrounding area do not fully match those of the Air Force laboratories located on Wright Patterson AFB. However, there are ways to make up for this lack of Air Force laboratories. After a consolidation, with 40 percent of their time now spent conducting research, professors could perform this research at appropriate Air Force laboratories including those at Wright-Patterson AFB. In addition, AFIT students could, as some NPS students do, take six week experience tours at various sites including the labs at Wright Patterson AFB. One realizes that there would be added costs associated with this off-site arrangement.

4. Can NPS establish individual programs to satisfy Air Force requirements that are currently being met at AFIT?

As NPS has demonstrated with the Army's acquisition program at NPS, so too would it be possible to develop individual programs to satisfy Air Force requirements currently being met at AFIT. Service schools are unique in that they can be very responsive to the needs of program sponsors. Various Air Force commands could become sponsors of any special curricula that may need to be established if a corsolidation were to occur. This would ensure, as it has done for the Army, that the Service's needs are being met. NPS currently is matching 92 percent of AFIT courses in similar courses already being taught at NPS. Any new courses that would have to be generated at NPS could be done easily by AFIT professors who are already teaching these classes.

Adding these additional Masters and Ph.D. courses would enhance the education received by both current and future NPS students (Air Force Officers included). NPS could establish itself as the premier site for military postgraduate education and joint military/civilian research.

5. What are the cost implications for NPS from this consolidation?

This was a question that requires additional data in order to adequately answer.

C. FURTHER RESEARCH AREAS

1. One area that would require closer scrutiny if a consolidation was being proposed is NPS laboratories excess

capacity and their ability to accommodate specific AFIT laboratories. If any specific laboratory equipment would be required to be moved from AFIT to NPS would the facilities at NPS be adequate enough to house this equipment.

2. A full costing survey would be needed to look at costs associated with moving the entire AFIT program to NPS. While previous studies have considered only specific programs, none have looked at costs involving moving all programs.

3. AFIT might also be considered as a possible site for a combined DoD postgraduate university. Therefore, a full costing survey should be completed to look at costs associated with moving the entire NPS program to AFIT.

4. In considering making NPS the sole site for a DoD postgraduate university, along with a full costing survey, a qualitative study of making NPS the sole site for a DoD postgraduate university should be completed. This study would take into account any factors a costing survey would omit.

5. Any consideration of consolidating should include all sites being proposed. Therefore, a qualitative study of making AFIT the sole site for a DoD postgraduate university should also be completed.

D. CONCLUSION

This is a topic that is very sensitive to both the Navy and Air Force. Both schools are meeting their Service's needs and any consideration of consolidating should be carefully

scrutinized. Any serious consolidation proposals would move this issue into a full analysis of those areas that are specific Service responsibilities and those in which interservice and joint training more effectively meet the needs of the nation. This thesis does not conclude that AFIT should be moved to NPS. Hopefully this thesis will be used as a tool to start discussion between the two schools concerning a possible consolidation.

The decision to establish a single DoD Postgraduate university should be an easy choice. It offers the opportunity to not only reduce overall costs, but also a chance to create a premier teaching and research facility dedicated to producing a better educated Officer to help lead the United States military into the twenty first century.

APPENDIX A - AFIT COURSE COMPARISON

1. Acquisition Logistics Management

AFIT	ACQUISITION LOGISTICS MANAGEMENT	NPS	EQUIVALENT COURSE
AMGT 336	Principles in Financial Accounting	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
LOGM 325	Quantitative Methods for Managers	MA 2300	Mathematics for Management
QMGT 290	Introduction to AFIT Computer Systems	IS 0123	Computer Skills Development
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
LOGM 568	Logistics Management	MN 3372	Material Logistics
STAT 525	Applied Statistics for Managers I	OS 3105	Statistical Analysis for Management I
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
LOGM 614	Acquisition Logistics Overview	MN 4310	Logistics Engineering
STAT 535	Applied Statistics for Managers II	OS 3106	Statistical Analysis for Management II

QMGT 575	Production and Operations Methods	MN 3374 OS 3006	Production Management: A TQM/L Perspective Operations Research Methodology
AMGT 520	Managerial Economics	MN 3140	Microeconomic Theory
AMGT 601	Governmental Accounting / Financial Management Control Systems	MN 3154	Financial Management in the Armed Forces
LOGM 569	Maintenance and Production Management	MN 3374	Production Management: A TQM/L Perspective
LOGM 590	Computer Simulation for Managers	MN 4312	Simulation Modeling for Managerial Decision Making
CMGT 523	Contracting and Acquisition Management	MN 3303	Principles of Acquisition and Contracting
LOGM 510	Information Support for Managers	IS 3183	Management Information Systems
AMGT 559	Life Cycle Cost and Reliability	MN 4310	Logistics Engineering

2. Aeronautical Engineering

AFIT	AERONAUTICAL ENGINEERING	NPS	EQUIVALENT COURSE
AERO 535	Low Speed Aerodynamics	AA 3501	Aerodynamic Analysis
AERO 536	High Speed Aerodynamics	AA 4502	High-Speed Aerodynamics
MECH 528	Aircraft Stability	AA 3340	Flight Dynamics
MECH 423	Dynamics of Aerospace Systems	ME 2502	Dynamics
MECH 444	Analysis of Structural Systems	AA 2820	Spacecraft Structures
MENG 431	Propulsion	ME 3240	Reciprocating and Gas Turbine Power Plants
MATH 511	Methods of Applied Mathematics I	MA 2049	Vector Analysis with Applications
MATH 513	Methods of Applied Mathematics II	MA 3675 MA 3132	Theory of Functions of a Complex Variable Partial Differential Equations and Integral Transforms
	FLUID MECHANICS/ AERODYNAMICS SEQUENCES		
AERO 725	High Lift Aerodynamics	AA 4305	V/STOL Aircraft Technology
AERO 612	Perturbation Methods in Aircraft Aerodynamics	AA 4502	High-Speed Aerodynamics
AERO 636	Aerodynamics of Wings and Bodies	AA 3501	Aerodynamic Analysis
AERO 622	Introductory Hypersonics	AA 4844	Hypersonic Flight

AERO 729	Physical Gas Dynamics	AA 4506	Rarefied Gas Dynamics
AERO 624	Advanced Hypersonics	AA 4844	Hypersonic Flight
AERO 520	Viscous Flow Theory	AA 2042	Fundamentals of Thermo and Fluid Dynamics
MENG 674	Convection Heat Transfer	ME 4162	Convection Heat Transfer
MENG 673	Radiation Heat Transfer	ME 4163	Radiation Heat Transfer
MENG 732	Advanced Turbomachinery	ME 3240	Reciprocating and Gas Turbine Power Plants
MENG 733	Airbreathing Engine Design	AA 4451	Aircraft Engine Design
MENG 634	Hypersonic Airbreathing Propulsion	AA 4844	Hypersonic Flight
MENG 530	Chemical Rocket Propulsion	AA 3851	Spacecraft Propulsion
AERO 827	Turbulent Flow	ME 4220	Viscous Flow
AERO 752	Computational Aerodynamics	AA 4507	Computational Fluid Dynamics and Heat Transfer
AERO 753	Advanced Computational Aerodynamics	AA 4507	Computational Fluid Dynamics and Heat Transfer
	SOLID MECHANICS SEQUENCES		
MECH 600	Elasticity I	ME 4612	Advanced Mechanics of Solids
MECH 642	Finite Element Methods for Structural Analysis I	ME 3440	Engineering Analysis

MECH 644	Finite Element Methods for Structural Analysis II	ME 4613	Finite Element Methods
MECH 515	Theory of Vibrations	ME 3521	Mechanical Vibration
MECH 610	Structural Vibrations	ME 4620	Theory of Continuous Media
MECH 711	Structural Damping	PH 3458	Noise Shock and Vibration Control
AERO 636	Aerodynamics of Wings and Bodies	AA 3501	Aerodynamic Analysis
MECH 662	Introduction to Aeroelasticity	AA 4318	Aeroelasticity
MECH 541	Mechanics of Composite Materials	MS 4822	The Engineering and Science of Composite Materials
MECH 605	Fracture Mechanics	MS 3202	Properties Problems and Failure of Materials
MECH 701	Inelastic Material Behavior	ME 4612	Advanced Mechanics of Solids
	FLIGHT MECHANICS AND SYSTEMS SEQUENCES		
MECH 556	Optimal Performance I	AA 3701 AA 4703	Missile Aerodynamics Missile Flight Analysis
MECH 628	Aircraft Control	AA 3340	Flight Dynamics
MECH 728	Advanced Flight Mechanics	AA 4342	Advanced Control for Aerospace Systems
MECH 622	Functional Optimization and Optimal Control	AA 3341	Aerospace Controls

SENG 665	Multivariable Control Theory	ME 4811	Modern Control Systems
MECH 623	Advanced Functional Optimization I	AA 4342	Advanced Control for Aerospace Systems
SENG 564	Conventional Weapons Effects	PH 4858	Weapons Lethality and Survivability
NENG 590	Nuclear Weapons Physics	PH 4856	Physics of Nuclear Weapons
STAT 687	Mathematics of Reliability Theory I	AA 4201	Reliability Engineering and System Safety Management
SENG 685	Reliability Engineering	AA 4201	Reliability Engineering and System Safety Management
SENG 687	Advanced Topics in Reliability		No Match
MECH 720	Analytical Mechanics I	ME 4821	Advanced Dynamics
MECH 723	Advanced Robotics	CS 4313	Advanced Robotics Systems
MECH 725	Man-in-the Loop Control	CS 4310	Artificial Intelligence Techniques for Military Applications

3. Astronautical Engineering

AFIT	ASTRONAUTICAL ENGINEERING	NPS	EQUIVALENT COURSE
MECH 423	Dynamics of Aerospace Systems	ME 2502	Dynamics
SENG 525	Linear Systems Analysis	EC 2420	Linear Systems
SENG 565	Control and State Space Concepts	EC 2300	Control Systems
MECH 532	Fundamentals of Astrodynamics	PH 2511	Orbital Mechanics
MECH 533	Problems in Space Flight	AA 3815	Space Dynamics
PHYS 521	Space Surveillance	SS 3525	Remote Sensing
EENG 421	Space Communication Systems	EC 2500	Communications Theory
MECH 444	Analysis of Structural Elements	AA 2820	Spacecraft Structures
MENG 530	Chemical Rocket Propulsion	AA 3851	Spacecraft Propulsion
	GUIDANCE AND CONTROL SEQUENCE		
MECH 518	Dynamics of Space Structures	AE 3815	Spacecraft Dynamics
SENG 665	Multivariable Control Theory	ME 4811	Modern Control Systems
MECH 722	Control of Flexible Spacecraft	AA 4816	Dynamics of Flexible Space Structures
MECH 720	Analytical Mechanics	ME 4821	Advanced Dynamics
MECH 723	Advanced Robotics	CS 4313	Advanced Robotics Systems

MECH 725	Man-in-the-Loop Control	CS 4310	Advanced Artificial Intelligence
MECH 636	Advanced Astrodynamics	MA 4362	Orbital Mechanics
MECH 731	Modern Methods in Orbit Determination	MA 4362	Orbital Mechanics
	INSTRUMENTATION SEQUENCE		
EENG 534	Fundamentals of Aerospace Components & Systems	AA 4341	Aerospace Controls
EENG 660	Feedback Systems II	EC 2300	Control Systems
EENG 635	Inertial Guidance & Control of Aerospace Vehicles	AA 4341	Aerospace Controls
EENG 735	Navigation Systems Analysis and Integration	AA 4342	Advanced Control for Aerospace Systems
	ROCKET PROPULSION SEQUENCE		
MENG 530	Chemical Rocket Propulsion	AA 3851	Spacecraft Propulsion
MENG 630	Fluid Mechanics of Rockets	ME 3201	Intermediate Fluid Dynamics
MENG 632	Nonchemical Propulsion	AA 3451	Military Aircraft and Missile Propulsion
MENG 631	Solid Rocket Propulsion	AA 4452	Tactical Missile Propulsion
	STRUCTURAL SEQUENCES		
MECH 600	Elasticity	ME 4612	Advanced Mechanics of Solids

MECH 642	Finite Element Methods for Structural Analysis I	ME 3440	Engineering Analysis
MECH 644	Finite Element Methods for Structural Analysis II	ME 4613	Finite Element Methods
MECH 515	Theory of Vibration	ME 3521	Mechanical Vibration
MECH 610	Structural Vibrations	ME 4620	Theory of Continuous Media
MECH 711	Structural Damping	PH 3458	Noise Shock and Vibration Control
	REENTRY AERODYNAMICS SEQUENCE		
AERO 520	Viscous Flow Theory	AA 2042 AA 3501	Fundamentals of Thermo and Fluid Dynamics Aerodynamic Analysis
AERO 622	Introductory Hypersonics	AA 4844	Hypersonic Flight
AERO 729	Physical Gas Dynamics	AA 4506	Rarefied Gas Dynamics
	SPACE FACILITIES SPECIALTY SEQUENCE		
MENG 530	Chemical Rocket Propulsion	AA 3851	Spacecraft Propulsion
MECH 518	Dynamics of Space Structure	AA 3815	Introduction to Spacecraft Dynamics
MENG 532	Space Power Systems	EO 3740	Space Power
SENG 520	Systems Analysis for Design	ME 2801	Introduction to Engineering Systems Dynamics
SENG 585	Reliability in System Design		No Match

AMGT 559	Life Cycle Cost and Reliability	MN 4310	Logistics Engineering
CMGT 523	Contract and Acquisition Management	MN 3303	Principles of Acquisition and Contracting

4. Contracting Management

AFIT	CONTRACTING MANAGEMENT	NPS	EQUIVALENT COURSE
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
LOGM 325	Quantitative Methods for Managers	MA 2300	Mathematics for Management
QMGT 290	Introduction to AFIT Computers	IS 0123	Computer Skills Development
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
STAT 525	Applied Statistics for Managers I	OS 3105	Statistical Analysis for Management I
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
AMGT 520	Managerial Economics	MN 3140	Microeconomic Theory
LOGM 510	Information Support for Managers	IS 3183	Information Systems Management
CMGT 520	Systems Contracting Management	MN 4301	Contracting for Major Systems
QMGT 675	Production and Operations Methods	MN 3374 OS 3006	Production Management: A TQM/L Perspective Operations Research Methodology

STAT 535	Applied Statistics for Managers II	OS 3106	Statistical Analysis for Management II
CMGT 552	Seminar in Contract Management	MN 3305	Contract Administration
SMGT 643	Systems Acquisition Management	MN 3301	Systems Acquisition and Project Management
CMGT 550	Systems Production Management	MN 4307	Program Management Policy and Control
AMGT 601	Government Accounting and Financial Management Control Systems	MN 3154	Financial Management in the Armed Forces
LAWS 550	Legal Principles / Government Contracting	MN 3312	Contract Law
CMGT 654	Seminar in Acquisition Management	MN 4371	Acquisition and Contracting Theory

5. Cost Analysis

AFIT	COST ANALYSIS	NPS	EQUIVALENT COURSE
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
QMGT 290	Introduction to AFIT Computers	IS 0123	Computer Skills Development
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
AMGT 520	Managerial Economics	MN 3140	Microeconomic Theory
QMGT 670	Statistics for Cost Analysis	OS 3101	Statistical Analysis for Management
AMGT 600	Managerial Accounting	MN 3161	Management Accounting
QMGT 671	Defense Cost Modeling	OA 4702	Cost Estimation
QMGT 675	Production and Operations Methods	MN 3374 OS 3006	Production Management: A TQM/L Perspective Operations Research Methodology
IMGT 677	Quantitative Management of Software	OA 4702	Cost Estimation
COST 673	Cost Estimation for Weapons Systems Production	OA 4702	Cost Estimation
QMGT 660	Project Risk Analysis		No Match

QMGT 672	Model Diagnostics	MN 4163	Analytical Techniques for Financial Control and Planning
AMGT 559	Life Cycle Cost and Reliability	MN 4310	Logistics Engineering
SMGT 647	Acquisition Strategy	MN 4301 MN 4371	Contracting for Major Systems Acquisition and Contracting Policy
AMGT 602	Federal Financial Management	MN 3172	Public Policy and Budgeting
SMGT 643	Systems Acquisition Management	MN 3301	Systems Acquisition and Program Management
SMGT 646	Project Management	MN 4307	Program Management Policy and Control
LOGM 568	Logistics Management	MN 3372	Material Logistics
LOGM 630	Forecasting Management	MN 3372	Material Logistics

6. Computer Engineering / Computer Systems

AFIT	COMPUTER ENGINEERING / COMPUTER SYSTEMS	NPS	EQUIVALENT COURSE
CSCE 431	Introduction to Discrete Mathematics	MA 3026	Discrete Mathematics with Applications
CSCE 486	Introduction to Data Structures and Program Design	CS 3300	Data Structures
CSCE 488	Introduction to Logic Design	CS 3010	Computer Systems Principles
AMGT 553	Software Project Management	IS 4300	Software Engineering and Management
CSCE 586	Advanced Information Structures	CS 3300	Data Structures
CSCE 588	Computer Systems Architecture	CS 3200	Computer Architecture
CSCE 589	Operating Systems	CS 3450	Operating Systems
CSCE 594	Software Analysis and Design II	CS 4114	Advanced Topics in Object Oriented Programming
CSCE 595	Software Generation and Maintenance	CS 4500	Software Engineering
CSCE 687	Advanced Microprocessor Design Laboratory	EC 3800	Microprocessor Based System Design
CSCE 692	Design Principles of Computer Architecture	EC 3840	Introduction to Computer Architecture
CSCE 531	Advanced Mathematics for Computer Science	MA 2025	Bridge to Advanced Mathematics

CSCE 532	Automata and Formal Language Theory	CS 3601	Theory of Formal Languages and Automata
CSCE 544	Data Security	CS 4601	Computer Security
CSCE 631	Mathematics for Computer Hardware and Software Desigr		No Match
CSCE 647	Queuing in Computer Systems	CS 4112	Distributed Operating Systems
CSCE 663	Compiler Theory and Implementation	CS 3113	Introduction to Compiler Writing
CSCE 686	Advanced Algorithm Design	CS 3650	Design and Analysis of Algorithms
CSCE 756	Logic Programming		No Match
CSCE 786	Mathematical Theory of Computation	CS 3601	Theory of Formal Languages and Automata
CSCE 792	Parallel Computer Architecture	CS 4451	Design and Analysis of Multiple-Processor, Real-Time Computers
EENG 653	Introduction to VLSI Design	EC 4780	VLSI Systems Design
EENG 695	VLSI Systems Design	EC 4870	VLSI Systems Design
EENG 795	Advanced Topics in VLSI Systems	EC 4900	Special Topics in Electrical Engineering
CSCE 593	Software Analysis and Design I	CS 3460	Software Methodology
CSCE 594	Software Analysis and Design II	CS 4114	Advanced Topics in Object Oriented {Programming
CSCE 693	Principles of Embedded Software		No Match

CSCE 793	Formal-Based Methods in Software Engineering	CS 4500	Software Engineering
CSCE 546	Introduction to Computer Database Systems	CS 3320	Database Systems
CSCE 646	Database Design and Implementation	CS 3320	Database Systems
CSCE 582	Interactive Computer Graphics	CS 4202	Computer Graphics
CSCE 682	Raster Graphics	CS 4202	Computer Graphics
MATH 521	Applied Linear Algebra	MA 3046	Matrix Theory and Computational Linear Algebra
MATH 600	Mathematical Analysis	MA 3605	Fundamentals of Analysis I
MATH 674	Numerical Analysis I	MA 3232	Numerical Analysis
CSCE 523	Artificial Intelligence	CS 3310	Artificial Intelligence
CSCE 623	Artificial Intelligence Systems Design	CS 4310	Artificial Intelligence Techniques for Military Applications
CSCE 624	Knowledge-Based Systems	CS 4311	Expert Systems

7. Electrical Engineering

AFIT	ELECTRICAL ENGINEERING	NPS	EQUIVALENT COURSE
EENG 665	Random Signal and System Analysis	EC 3410 EC 3500	Discrete-Time Random Processes Analysis of Random Signals
EENG 669	Digital Communications I	EC 3510	Communications Engineering
EENG 670	Digital Communications II	EC 4550	Digital Communication
EENG 671	Statistical Communications Theory	EC 4570 EC 4580	Decision and Estimation Theory Information Theory
EENG 535	Radar Systems Analysis	EC 3670	Principles of Radar Systems
EENG 666	Detection and Estimation Theory	EC 4570	Adaptive Signal Processing
EENG 668	Advanced Radar Systems Analysis	EC 4610	Radar Systems
EENG 691	Digital Signal Processing	EC 3400	Digital Signal Processing
EENG 548	Human Factors Engineering	OA 3401 OA 3402	Human Factors in Systems Design I Human Factors in Systems Design II
CSCE 554	Computer Communications Networks	CS 3502	Computer Communications and Networks
CSCE 588	Computer Architecture	CS 3200	Computer Architecture
STAT 605	Probability Theory for Communications and Control	OA 3101	Probability

EENG 580	Computational Methods for Discrete Linear Systems	EC 2400	Discrete Systems
EENG 680	Introduction to Signal Processing	EC 3400	Digital Sound Processing
EENG 681	Digital Filter Design	EC 3400	Digital Sound Processing
EENG 682	Statistical Signal Processing	EC 3420	Statistical Digital Signal Processing
EENG 515	Linear Systems, Fourier Transforms and Optics	EC 3210	Introduction to Electro-Optical Engineering
EENG 527	Introduction to Fourier Optics	PH 3252	Electro-Optics
EENG 672	Statistical Optics	EC 4900	Special Topics in Electrical Engineering
EENG 715	Advanced Topics in Optical Information Processing	EC 4900	Special Topics in Electrical Engineering
EENG 524	Electromagnetic Waves I	EC 2600	Intro to Fields and Waves
EENG 576	Microwave Circuits	EC 3610	Microwave Circuits
EENG 607	Lightning and EMP	EC 1660	High Frequency Techniques
EENG 625	Antennas	EC 3600	Electromagnetic Radiation Scattering and Propagation
EENG 628	Electromagnetic Waves II	EC 2610	Electromagnetic Engineering
EENG 630	Electromagnetic Radiation and Scattering	EC 3600	Electromagnetic Radiation, Scattering and Propagation

EENG 725	Advanced Electromagnetic Field Theory I	EC 4600	Advanced Electromagnetic Theory
EENG 726	Advanced Electromagnetic Field Theory II	EC 4600	Advanced Electromagnetic Theory
EENG 629	Electronic Warfare I	EC 4670	Electronic Warfare
EENG 627	RCS Analysis, Measurement, and Reduction	EC 4630	RCS Prediction and Reduction
MATH 504	Differential Equations of Mathematical Physics	PH 3991	Physics of Oscillations and Waves
MATH 506	Applied Partial Differential Equations	MA 3132	Partial Differential Equations and Integral Transforms
MATH 512	Mathematical Methods of Scattering	EC 4600	Advanced Electromagnetic Theory
PHYS 541	Fundamentals of Optics I	PH 3292	Optics and Optoelectrics
PHYS 520	Fundamental Lasers	PH 4283	Laser Physics
PHYS 543	Fundamentals of Optics II	PH 3292	Optics and Optoelectrics
PHYS 544	Fundamentals of Optics III	PH 3252	Electro-optics
EENG 660	Feedback Systems II	SE 3015	Applied Physics Laboratory IV: Systems Control
EENG 662	Optical Feedback Control	EC 3310	Linear Optimal Estimation and Control
EENG 708	Design of Linear Multivariate Feedback Systems	EC 4320	Design of Linear Control Systems

EENG 742	Synthesis of Optimal Control Systems	EC 3310	Linear Optimal Estimation and Control
EENG 765	Stochastic Estimation and Control I	EC 3420	Statistical Digital Signal Processing
EENG 766	Stochastic Estimation and Control II	EC 4330	Navigation, Missile, and Avionics Systems
EENG 768	Stochastic Estimation and Control III	EC 4340	Navigation, Missile and Avionics systems
EENG 665	Discrete-Data Control Systems	EC 3500 EC 3410	Analysis of Random Signals Discrete-Time Random Processes
EENG 664	Digital Control Systems	SE 2014	Applied Physics Laboratory II: Digital Techniques
EENG 712	Linear Estimation and Control	EC 3410 EC 3310	Discrete-Time Random Processes Linear Optimal Estimation and Control
EENG 534	Fundamentals of Aerospace Instruments & Navigation Systems		No Match
EENG 737	Digital Methods of Aerospace Guidance	PH 2511 AA 3815 AA 4818	Introduction to Orbital Mechanics Introduction to Spacecraft Dynamics Spacecraft Attitude, Dynamics and Control
EENG 738	Digital Avionics Fire Control		No Match

MECH 529	Dynamics and Control of Flight Vehicles	ME 4821	Advanced Dynamics
EENG 640	Automatic Flight Control I	AA 2339	Aerospace System Dynamics
EENG 641	Automatic Flight Control II	AA 4341	Aerospace Controls
EENG 635	Inertial Navigation Subsystems	AA 4341	Aerospace Controls
EENG 735	Navigation Systems Analysis and Synthesis	EC 4330	Navigation, Missile and Avionics Systems
CSCE 589	Operating Systems	CS 3450	Operating Systems
CSCE 593	Software Analysis and Design	CS 3460	Software Methodology
PHYS 570	Physics of Solid State Devices	PH 4760	Solid State Physics
EENG 576	Microwave Circuits	EC 3610	Microwave Circuits
EENG 596	Integrated Circuit Technology		NO MATCH
EENG 675	Semiconductor Device Technology	EC 2200 EC 2210	Electronics Engineering I Electronics Engineering II
EENG 676	Microwave Electronic Devices	EC 3620	Microwave Devices
EENG 695	VLSI Design	EC 4870	VLSI Systems Design
EENG 795	Advanced Topics in VLSI Design	EC 4900	Special topics in Electrical Engineering
EENG 653	Introduction to VLSI Design	EC 4870	VLSI Systems Design
CSCE 523	Artificial Intelligence	CS 3310	Artificial Intelligence

CSCE 623	Artificial Intelligence Systems Design	CS 4310	Advanced Artificial Intelligence
CSCE 624	Knowledge Based Systems	CS 4311	Expert Systems
EENG 620	Pattern Recognition I		NO MATCH
EENG 621	Pattern Recognition II		NO MATCH
EENG 817	Advanced Topics in Pattern Recognition		NO MATCH

8. Environmental Engineering

AFIT	ENVIRONMENTAL ENGINEERING	NPS	EQUIVALENT COURSE
ENVR 510	US Environmental Law and Policy		No Match
ENVR 520	Environmental Systems Engineering		No Match
ENVR 530	Environmental Risk Analysis		No Match
ENVR 550	Pollution Prevention / Hazardous Waste Management		No Match
CMGT 524	Contracting for Engineers	MN 3371	Contracts Management and Administration
ENVR 655	Capstone Seminar in Engineering and Environmental Management		No Match
LOGM 510	Information Support for Managers	IS 3183	Management Information Systems
ORSC 542	Management and Behavior in Organizations Theory	MN 3105	Organization and Management
STAT 526	Managerial Statistics I	OS 3105	Statistical Analysis for Management
OPER 562	Introduction to Management Science	OS 3106	Operations Research for Management
ENVR 500	Engineering and Environmental Management Symposium		No Match

9. Information Resource Management

AFIT	INFORMATION RESOURCE MANAGEMENT	NPS	EQUIVALENT COURSE
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
LOGM 325	Quantitative Methods for Managers	MA 2300	Mathematics for Management
IMGT 290	Introduction to Computing Technologies	IS 2000	Introduction to Computer Management
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
IMGT 630	Conceptual Foundations for Information Systems	IS 3183	Management Information Systems
IMGT 657	Data Communication for Managers	IS 4502	Telecommunication Networks
STAT 525	Applied Statistics for Managers I	OS 3105	Statistical Analysis for Management I
IMGT 510	Problem Solving and Structured Programming	CS 2970	Structured Programming with ADA
STAT 535	Applied Statistics for Managers II	OS 3106	Statistical Analysis for Management II
OPER 526	Quantitative Decision Making	OS 3004	Operations Research for Computer Systems Management

IMGT 560	Computer System Concepts	IS 3000	Distributed Computer Systems
IMGT 651	Systems Analysis and Design	IS 4200	Systems Analysis and Design
IMGT 658	Local Area Networks	IS 3502	Computer Networks: Wide Area/Local Area
IMGT 561	Database Management Systems	IS 4183	Applications of Database Management Systems
LOGM 592	Artificial Intelligence Applications in Management	IS 4186	Introduction to Knowledge-Based Systems and Artificial Intelligence
ORSC 616	Human Factors in Air Force Systems		No Match
AMGT 601	Government Accounting and Financial Management Control Systems	MN 3154	Financial Management in the Armed Forces
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
IMGT 540	Information Engineering	IS 3171	Economic Evaluation of Information Systems II
IMGT 654	Information Systems Policy	IS 4182	Information Systems Management
AMGT 520	Managerial Economics I	MN 3140	Microeconomic Theory
ORSC 626	Organizational Development	MN 4123	Managing Planned Change in Complex Organizations

10. Logistics Management

AFIT	LOGISTICS MANAGEMENT	NPS	EQUIVALENT COURSE
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
LOGM 325	Quantitative Methods for Managers	MA 2300	Mathematics for Management
QMGT 290	Introduction to AFIT Computers	IS 0123	Computer Skills Development
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
LOGM 568	Logistics Management	MN 3372	Material Logistics
STAT 525	Applied Statistics for Managers I	OS 3105	Statistical Analysis for Management I
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
LOGM 590	Computer Simulation for Managers	MN 4312	Simulation Modeling for Managerial Decision Making
STAT 535	Applied Statistics for Managers II	OS 3106	Statistical Analysis for Management II
QMGT 675	Production and Operations Methods	MN 3374 OS 3006	Production Management: A TQM/L Perspective Operations Research Methodology

AMGT 601	Government Accounting and Financial Management Control Systems	MN 3154	Financial Management in the Armed Forces
CMGT 523	Contracting and Acquisition Management	MN 3303	Principles of Acquisition and Contracting
LOGM 569	Maintenance and Production Management	MN 3374	Production Management: A TQM/L Perspective
LOGM 510	Information Support for Managers	IS 3183	Management Information Systems
AMGT 520	Managerial Economics I	MN 3140	Microeconomic Theory
LOGM 609	Quality Control Management	OS 3302	Quality Assurance and Reliability Methods
LOGM 570	Principles of Inventory Systems for Non-Supply Officers	MN 3377	Inventory Management
LOGM 631	Scheduling Theory and Application	MN 3372 MN 3374	Material Logistics Production Management: A TQM/L Perspective
LOGM 636	Service Operations Management	MN 3374	Production Management: A TQM/L Perspective

11. Applied Mathematics

AFIT	APPLIED MATHEMATICS	NPS	EQUIVALENT COURSE
MATH 600	Mathematical Analysis	MA 3605	Fundamentals of Analysis I
MATH 601	Complex Analysis	MA 3606	Fundamentals of Analysis II
MATH 621	Linear Algebra	MA 3042	Linear Algebra
STAT 527	Introduction to Probability	OA 3101	Probability
STAT 537	Introduction to Statistics	OA 3103	Statistics
STAT 696	Applied General Linear Models	MA 3301	Linear Programming
MATH 607	Calculus of Variations	MA 3110	Intermediate Analysis
MATH 609	Integral Transform Theory	MA 3132	Partial Differential Equations and Integral Transforms
STAT 687	Mathematics of Reliability Theory I	OA 4303	Sample Inspection and Quality Analysis
STAT 697	Mathematics of Reliability Theory II	OA 4302	Reliability and Weapons System Effectiveness
STAT 698	Stochastic Processes	OA 4306	Stochastic Processes I
MATH 674	Numerical Analysis I	MA 3232	Numerical Analysis
MATH 676	Numerical Analysis II	MA 3243	Numerical Methods for Partial Differential Equations
MATH 678	Finite Element Techniques in Applied Science	MA 4245	Finite Element Methods

12. Maintenance Management

AFIT	MAINTENANCE MANAGEMENT	NPS	EQUIVALENT COURSE
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
LOGM 325	Quantitative Methods for Managers	MA 2300	Mathematics for Management
QMGT 290	Introduction to AFIT Computers	IS 0123	Computer Skills Development
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
AMGT 601	Government Accounting and Financial Management Control Systems	MN 3154	Financial Management in the Armed Forces
LOGM 568	Logistics Management	MN 3372	Material Logistics
STAT 525	Applied Statistics for Managers I	OS 3105	Statistical Analysis for Management I
STAT 535	Applied Statistics for Managers II	OS 3106	Statistical Analysis for Management II
QMGT 675	Production and Operations Methods	MN 3374	Production Management: A TQM/L Perspective
		OS 3006	Operations Research for Management

LOGM 569	Maintenance and Production Management	MN 3374	Production Management: A TQM/L Perspective
LOGM 590	Computer Simulation for Managers	MN 4312	Simulation Modeling for Managerial Decision Making
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
LOGM 510	Information Support for Managers	IS 3183	Management Information Systems
LOGM 609	Quality Control Management	OS 3302	Quality Assurance and Reliability Methods
CMGT 523	Contracting and Acquisition Management	MN 3303	Principles of Acquisition and Contracting
SMGT 643	Systems Acquisition Management	Mn 3301	Systems Acquisition and Project Management
AMGT 520	Managerial Economics	MN 3140	Microeconomic Theory
AMGT 620	Macroeconomics and Public Policy	MN 4145	Policy Analysis
LOGM 631	Scheduling: Theory and Application	MN 3372 MN 3374	Material Logistics Production Management: A TQM/L Perspective
LOGM 637	Theory of Constraints		No Match

13. Operational Analysis

AFIT	OPERATIONAL ANALYSIS	NPS	EQUIVALENT COURSE
MATH 503	Mathematical Methods	MA 3110	Intermediate Analysis
MATH 507	Numerical Methods	MA 3046	Matrix Theory and Computational Linear Algebra
STAT 527	Introduction to Probability	OA 3101	Probability
STAT 537	Introduction to Statistics	OA 3103	Statistics
STAT 696	Applied General Linear Methods	MA 3301	Linear Programming
OPER 510	Deterministic Operations Research	OS 3008	Analytical Planning Methodology
OPER 520	Probabilistic Operations Research	OA 3301 OA 4301	Stochastic Models I Stochastic Models II
OPER 610	Linear Programming and Network Flows	OA 3201	Linear Programming
OPER 634	Applied Linear Models	OA 4102	Regression Analysis
OPER 666	Military Systems Simulation	OA 3302	OA System Simulation
OPER 595	Issues in Operational Analysis	OA 2910	Selected Topics in Operational Analysis
OPER 702	Modeling Transportation Systems	MN 4376	Defense Transportation System

EENG 574	Introduction to Communications, Command and Control and Principles of Electronic Warfare	EC 4670 EC 4680	Electronic Warfare Electronic Warfare Techniques and Systems
NENG 590	Weapons Physics	PH 3855	Nuclear Physics
NENG 596	Nuclear Weapons Effects	PH 4856	Physics of Nuclear Weapons
SENG 564	Conventional Weapons Effects	PH 4858	Weapons Lethality and Survivability

14. Operations Research

AFIT	OPERATIONS RESEARCH	NPS	EQUIVALENT COURSE
MATH 503	Mathematical Methods for Operational Science	MA 3110	Intermediate Analysis
MATH 507	Numerical Methods for O.R.	MA 3046	Matrix Theory and Computational Linear Algebra
STAT 527	Introduction to Probability	OA 3101	Probability
STAT 537	Introduction to Statistics	OA 3103	Statistics
STAT 696	Applied General Linear Models	MA 3301	Linear Programming
OPER 634	Applied Linear Models	OA 4102	Regression Analysis
COMM 685	Communications for Managers & Analysis		No Match
OPER 742	Analysis for Defense Decisions	OA 4601	Decision Analysis
OPER 398	Research Methods	OA 2900	Workshop in Operations Research/Systems Analysis
OPER 510	Deterministic Operations Research	OS 3008	Analytical Planning Methodology
OPER 520	Probabilistic Operations Research	OA 3301 OA 4301	Stochastic Models I Stochastic Models II
OPER 610	Linear Programming and Network Flows	OA 3201	Linear Programming
OPER 666	Military Systems Simulation	OA 3302	OA System Simulation

OPER 531	Economic Analysis I	OA 4701	Econometrics
OPER 631	Economic Analysis II	OA 4702	Cost Estimation

15. Applied Physics

AFIT	APPLIED PHYSICS	NPS	EQUIVALENT COURSE
PHYS 635	Thermal Physics	PH 3782	Thermodynamics and Statistical Physics
PHYS 600	Dynamics	PH 3152	Mechanics II Extended Systems
PHYS 601	Electromagnetics	PH 4353	Topics in Advanced Electricity and Magnetism
PHYS 640	Optics	PH 3292	Optics and Optoelectrics
PHYS 655	Quantum Mechanics I	PH 4971	Quantum Mechanics I
MATH 508	Applied Numerical Methods	MA 3232	Numerical Analysis
MATH 504	Differential Equations of Mathematical Physics	PH 3991	Physics of Oscillations and Waves II
PHYS 670	Introduction to Solid State Physics	PH 4760	Solid State Physics
PHYS 650	Kinetic Theory of Plasmas	PH 4661	Plasma Physics I
OENG 620	Laser Engineering	PH 4054	Physics of Directed Energy Weapons
NENG 651	Nuclear Physics	PH 3855	Nuclear Physics
PHYS 544	Fundamentals of Optics II	PH 3252	Electro-optics
PHYS 661	Atomic and Molecular Spectroscopy		NO MATCH
PHYS 700	Space Physics	PH 4515	Physics of the Satellite Environment

PHYS 744	Laser Physics II	PH 4662	Plasma Physics II
OENG 650	Optical Radiometry and Detection	PH 4253	Sensors Signals and Systems
OENG 660	Introduction to Non-Linear Optics		NO MATCH
OENG 740	Optical System Design		NO MATCH
OENG 780	Infrared Technology	PH 4254	Thermal Imaging and Surveillance
	NUCLEAR ENGINEERING SEQUENCE*		
NENG 605	Physics of Nuclear Explosions	PH 4856	Physics of Nuclear Weapons
NENG 631	Prompt Effects of Nuclear Weapons	PH 3171	Explosives and Explosions
NENG 660	Radiation Effects on Electronics	PH 4750	Solids and Radiation Effects
NENG 650	Nuclear Instrumentation		NO MATCH
NENG 671	Environmental Transport		NO MATCH
NENG 681	Nuclear Chemical Engineering		NO MATCH
NENG 685	Computational Nuclear Engineering		NO MATCH
NENG 721	Space Nuclear Power		NO MATCH
NENG 790	Nuclear System Design		NO MATCH

*Taught at AFIT only(based on prior agreement between schools)

16. Software Systems Management

AFIT	SOFTWARE SYSTEMS MANAGEMENT	NPS	EQUIVALENT COURSE
CSCE 031	Intro to Discrete Mathematics	MA 3026	Discrete Mathematics with Applications
CSCE 003	Introduction to Ada	CS 2970	Structured Programming with Ada
MATH 291	Math Review for Eng Managers	MAR 117	Single Variable Calculus
COMM 310	Fundamentals of Written Communications	MN 3333	Managerial Communication Skills
CSCE 593	Software Analysis & Design I	CS 3460	Software Methodology
CSCE 486	Intro to Data Structures and Programming Design	CS 3300	Data Structures
STAT 526	Managerial Statistics I	OS 3105	Statistical Analysis For Management I
COMM 687	Theory & Practice of Professional Communications	MN 3333	Managerial Communication Skills
CSCE 594	Software Analysis & Design II	CS 4114	Advanced Topics in Object Oriented Programming
STAT 536	Managerial Statistics II	OS 3106	Statistical Analysis For Management II
ECON 520	Managerial Economics I	Mn 3140	Microeconomic Theory
IMGT 676	Software Cost Estimation	OA 4702	Cost Estimation
CSCE 595	Software Generation and Maintenance	CS 4500	Software Engineering

IMGT 626	Software Configuration Management	IS 4300	Software Engineering and Management
IMGT 685	Software Product Assurance	IS 4300	Software Engineering and Management
OPER 562	Intro to Management Science	OS 3006	Operation Research for Management
AMGT 602	Federal Financial Management	Mn 3172	Public Policy and Budgeting
CSCE 589	Operating Systems	CS 3450	Operating Systems
ORSC 520	Organization and Management Theory	MN 3105	Organization and Management
CSCE 693	Principals of Embedded Software		No Match
CMGT 523	Contracting and Acquisition Management	MN 3303	Principles of Acquisition and Contracting

17. Space Operations

AFIT	SPACE OPERATIONS	NPS	EQUIVALENT COURSE
PHYS 519	Space Environment	PH 2514	Intro to the Space Environment
MECH 431	Introduction to Space Dynamics	AA 3815	Introduction to Spacecraft Dynamics
OPER 511	Intro to Space Programs and Operations	SS 3001	Military Applications of Space
PHYS 521	Space Surveillance	PH 4051	Concepts in Surveillance, Target Acquisition & Engagement
OPER 592	Space Operations Planning	SS 4002	Military Operations in Space
CSCE 362	Introduction to Fortran Programming	CS 2450	Computer Programming with Fortran
MATH 509	Mathematical Methods for Space Operations	MA 3110	Intermediate Analysis
STAT 527	Introduction to Probability	OA 3101	Probability
STAT 537	Introduction to Statistics	OA 3103	Statistics
EENG 571	Space Communications	EC 4590	Communications Satellite Systems Engineering
MENG 432	Space Propulsion Systems	AA 3851	Spacecraft Propulsion
OPER 571	Operations Research I	OS 3006	Operations Research for Management
OPER 572	Operations Research II	OS 3008	Operations Research Methodology

OPER 666	Military Systems Simulation	OA 3302	OA System Simulation
SMET 646	Project Management	MN 4307	Program Management Policy and Control
COMM 685	Communication for Managers and Analysis	MN 3333	Managerial Communication Skills
		OA 3104	Data Analysis

18. Supply Management

AFIT	SUPPLY MANAGEMENT	NPS	EQUIVALENT COURSE
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
LOGM 325	Quantitative Methods for Managers	MA 2300	Mathematics for Managers
QMGT 290	Introduction to AFIT Computers	IS 0123	Computer Skills Development
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
LOGM 510	Information Support for Management	IS 3183	Management Information Systems
LOGM 568	Logistics Management	MN 3372	Material Logistics
STAT 525	Applied Statistics for Managers I	OS 3105	Statistical Analysis for Management I
STAT 535	Applied Statistics for Managers II	OS 3106	Statistical Analysis for Management II
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
QMGT 675	Production and Operations Methods	MN 3374 OS 3006	Production Management: A TQM/L Perspective Operations Research Methodology

CMGT 523	Contracting and Acquisition Management	MN 3303	Principles of Acquisition and Contracting
LOGM 569	Maintenance and Production Management	MN 3374	Production Management: A TQM/L Perspective
LOGM 590	Computer Simulation for Managers	MN 4312	Simulation Modeling for Managerial Decision Making
LOGM 628	Reparable Inventory Management	MN 3377	Inventory Management
AMGT 601	Governmental Accounting and Financial Management Control Systems	MN 3154	Financial Management in the Armed Forces
LOGM 629	Consumable Inventory Management	MN 3377	Inventory Management
AMGT 520	Managerial Economics	MN 3140	Microeconomic Theory
LOGM 630	Forecasting Management	MN 3372	Material Logistics

19. System Engineering

AFIT	SYSTEMS ENGINEERING	NPS	EQUIVALENT COURSE
EENG 712	Linear Estimation and Control	EC 3410 EC 3310	Discrete-Time Random Processes Linear Optimal Estimation and Control
MECH 620	Systems Optimization	ME 4731	Engineering Design Optimization
STAT 601	Probability Theory for Communication and Control	OA 4103	Advanced Probability
SENG 520	Systems Analysis for Design	ME 2801	Introduction to Engineering Systems Dynamics
SENG 525	Linear Systems Analysis	EC 2420	Linear Systems
SENG 620	Topics in Systems Engineering		No Match
MECH 423	Dynamics of Aerospace Systems	ME 2502	Dynamics
MECH 529	Dynamics and Control of Flight Vehicles	ME 4821	Advanced Dynamics
MATH 521	Linear Algebra	MA 3042	Linear Algebra
EENG 540	Robotics Fundamentals	CS 4313	Advanced Robotic Systems
EENG 620	Pattern Recognition		No Match
MECH 725	Man-in-the-Loop Control	CS 4310	Advanced Artificial Intelligence
OPER 520	Probabilistic Operations Research	OA 3301 OA 4301	Stochastic Models I Stochastic Models II

OPER 750	Response Surface Methodology		No Match
OPER 766	Advanced Simulation	OA 4333	Simulation Methodology
OPER 767	Networks and Combined Optimization	OA 4202	Network Flows and Graphs
OPER 510	Deterministic Operations Research	OS 3008	Analytical Planning Methodology
OPER 768	Nonlinear Programming	OA 4201	Nonlinear Programming
STAT 687	Mathematics of Reliability Theory I	OA 4303	Sample Inspection and Quality Assurance
SENG 685	Reliability Engineering	AA 4201	Reliability Engineering and System Safety Management
SENG 687	Advanced Topics in Reliability		No Match
OPER 627	Systems Simulation and Analysis	OA 3302	OA System Simulation
OPER 766	Advanced Simulation	OA 4333	Simulation Methodology
OPER 684	Quantitative Forecasting	OA 4308	Time Series Analysis
SENG 565	Control and State Space Concepts	ME 4811	Modern Control Systems
MATH 552	Mathematics of Systems Modeling and Identification	MA 3400	Mathematical Modeling Processes
MECH 712	Nonlinear Oscillations	EC 4350	Nonlinear Control Systems
ENVR 520	Environmental Systems Engineering		No Match
ENVR 540	Environmental Planning		No Match

ENVR 550	Pollution Prevention and Hazardous Waste Management		No Match

20. Systems Management

AFIT	SYSTEMS MANAGEMENT	NPS	EQUIVALENT COURSE
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
MATH 291	Mathematics Review for Engineering Managers	MAR 142	Matrix Algebra
AMGT 600	Managerial Accounting	MN 3161	Management Accounting
AMGT 602	Federal Financial Management	MN 3172	Public Policy and Budgeting
STAT 526	Managerial Statistics I	OS 3105	Statistical Analysis for Management I
SMGT 643	System Acquisition Management	MN 3301	Systems Acquisition and Program Management
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
STAT 536	Managerial Statistics II	OS 3106	Statistical Analysis for Management II
QMGT 675	Production and Operating Methods	MN 3374 OS 3006	Production Management: A TQM/L Perspective Operations Research Methodology
SMGT 646	Project Management	MN 4307	Program Management Policy and Control

AMGT 520	Managerial Economics I	MN 3140	Microeconomic Theory
LOGM 590	Computer Simulation for Managers	MN 4312	Computer Simulation for Managerial Decision Making
AMGT 559	Life Cycle Cost and Reliability	MN 4310	Logistics Engineering
SMGT 647	Acquisition Strategy	MN 3105	Principles of Acquisition and Contracting
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
SMGT 640	Systems management	EO 4911	Systems Engineering Management

21. Transportation Management

AFIT	TRANSPORTATION MANAGEMENT	NPS	Equivalent Course
AMGT 336	Principles of Financial Management	MN 2150	Financial Accounting
COMM 310	Fundamentals of Written Communication	MN 3333	Managerial Communication Skills
LOGM 325	Quantitative Methods for Managers	MA 2300	Mathematics for Management
QMGT 290	Introduction to AFIT Computers	OS 0123	Computer Skills Development
COMM 687	Theory and Practice of Professional Communication	MN 3333	Managerial Communication Skills
STAT 525	Applied Statistics for Managers I	OS 3105	Statistical Analysis for Management I
LOGM 568	Logistics Management	MN 3372	Material Logistics
STAT 535	Applied Statistics for Managers II	OS 3106	Statistical Analysis for Management II
QMGT 675	Production and Operations Methods	MN 3374 OS 3006	Production Management: A TQM/L Perspective Operations Research Methodology
LOGM 590	Computer Simulation for Managers	MN 4312	Simulation Modeling for Managerial Decision Making
LOGM 617	Transportation Systems and Strategic Mobility	MN 4376	Defense Transportation System

LOGM 569	Maintenance and Production Management	MN 3374	Production Management: A TQM/L Perspective
LOGM 510	Information Support for Managers	IS 3183	Management Information Systems
LOGM 618	Transportation Management	MN 3373 MN 4373	Domestic Transportation Management International Transportation Management
CMGT 523	Contracting and Acquisition Management	MN 3303	Principles of Acquisition and Contracting
AMGT 520	Managerial Economics	MN 3140	Microeconomic Theory
ORSC 542	Management and Behavior in Organizations	MN 3105	Organization and Management
LOGM 619	Transportation Policy	MN 4376	Defense Transportation System

APPENDIX B - NPS CLASSROOM USAGE/AVAILABILITY

Bullard

Room #	Capacity	Usage Hours	Availability*
B-104	21	4	7
B-202	21	13	5

Bullard

total rooms	avg size	avg size (30 max)	total rooms avail	avg size	avg size (30 max)
2	21	21	2	21	21

Root

Room #	Capacity	Usage Hours	Availability*
R-109	35	8	Specialty class
R-200A	36	--	Other use
R-200D	20	--	Other use
R-202	54	--	Other Use
R-202A	8	--	Student study
R-202C	30	12	0
R-204	36	--	Academic groups
R-204A	20	--	Student study
R-208	30	20	5
R-210	30	--	Health Rsc Ctr
R-228	20	--	Civilian Ed
R-240	30	26	4
R-242	30	26	2
R-256	30	--	Distance Learn
R-260	30	--	Distance Learn

Root

total rooms	avg size	avg size (30 max)	total rooms avail	avg size	avg size (30 max)
15	29	27	4	30	30

Spanagel

Room #	Capacity	Usage Hours	Availability*
S-117	62	31	1
S-136	37	30	1
S-138	21	26	5
S-140	21	26	3
S-208	46	15	5
S-221	51	28	2
S-224	18	--	EW Study space
S-226	20	25	3
S-228	20	--	C^3 Study space
S-231	62	30	1
S-248	18	17	4

S-310	21	14	1
S-316	47	29	2
S-321	62	21	4
S-332	24	10	6
S-342	20	28	2
S-408	28	32	2
S-421	78	29	2
S-429	26	42	3

Spanagel

total rooms	avg size	avg size (30 max)	total rooms avail	avg size	avg size (30 max)
19	36	25	17	38	26

Ingersoll

Room #	Capacity	Usage Hours	Availability*
I-119	35	14	5
I-221	33	--	Other use
I-260	51	32	3
I-263	27	12	6
I-265	36	22	4
I-267	39	19	4
I-271	46	26	2
I-280	35	26	4
I-282	36	2	7
I-285	27	22	3
I-322	40	24	2
I-323	3[illegible]	28	2
I-325	31	20	5
I-361	60	14	5
I-365	32	--	Student study
I-366	32	--	Other use
I-368	32	--	TQL
I-369	32	--	Other use
I-377	25	--	Other use
I-379	16	--	Other use
I-380	16	--	Other use
I-381	28	5	7
I-386	25	20	3
I-387	30	24	1

Ingersoll

total rooms	avg size	avg size (30 max)	total rooms avail	avg size	avg size (30 max)
24	33	28	16	36	29

Glasgow

Room #	Capacity	Usage Hours	Availability*
G-B13	36	--	HRO Training
G-B14	33	10	6
G-B15	26	23	2
G-B17	34	14	5
G-B18	35	--	7
G-B19	36	--	Specialty class
G-103	26	--	Conference room
G-109	180	0	9
G-110	36	25	2
G-113	36	23	2
G-114	36	27	3
G-115	44	26	3
G-117	20	13	3
G-118	38	29	1
G-122	48	26	1
G-129	36	24	3
G-130	36	28	3
G-133	36	21	3
G-303	18	12	Specialty class
G-306	18	18	Specialty class
G-386	18	8	Specialty class
G-387	18	27	Specialty class
G-388	18	4	Specialty class
G-389	18	4	Specialty class

Glasgow

total rooms	avg size	avg size (30 max)	total rooms avail	avg size	avg size (30 max)
24	37	26	15	43	27

Halligan

Room #	Capacity	Usage Hours	Availability*
H-109	33	12	6
H-121A	33	33	0
H-121B	33	22	1
H-123	33	27	1
H-125	33	37	0
H-201E	32	32	1
H-201F	32	34	1

Halligan

total rooms	avg size	avg size (30 max)	total rooms avail	avg size	avg size (30 max)
7	33	30	7	33	30

Bldg 224

Room	#Capacity	Usage Hours	Availability*
M-112	24	9	5

Bldg 224

total rooms	avg size	avg size (30 max)	total rooms avail	avg size	avg size (30 max)
1	24	24	[illegible]	24	24

* Number of four credit classes that can be scheduled to conform with department scheduling practices.
Total Availability(# of extra courses/sections which can be scheduled) = 201.

B = Bullard Hall
R = Root Hall
S = Spanigal Hall
I = Ingersoll Hall
G = Glasgow Hall
H = Halligan Hall
M = Bldg 224

```
   62 total classrooms available
 x 9  courses per week per classroom
 558  courses can be scheduled
-201  total availability
 357  scheduled courses[1]
```

```
  357 scheduled courses
÷1800 total students
 .1983
```

.1983 = X ÷ [1800 NPS students + 445 AFIT students]

X = .1983 x 2250

X = 445 scheduled courses required

445 - 357 = 88 additional courses required

There are 201 classroom slots available to hold these additional 89 courses.

[1] - Separate sections of the same course are treated as separate courses

APPENDIX C - LABORATORY USAGE

Bullard

Room #	Capacity	Usage Hours	Purpose
B-100A	15	0	ECE power sys
B-201	21	4	ECE signals
B-201C/D/E	20	8	
B-208	25	3	ECE servo ctrl
B-224	24	1	ECE opti-elec

Root

Room #	Capacity	Usage Hours	Purpose
R-117A	18	--	Brief room
R-123	N/A	N/A	TS lab
R-123N&S	20	3	MR idea lab
R-125	8	--	
R-125A	N/A	N/A	Rsrch area
R-222	15	--	Sun stations
R-2?2	20	--	PC stations

Spanagel

Room #	Capacity	Usage Hours	Purpose
S-006	N/A	--	Nuclear Physics
S-025	12	--	Sonar tank
S-019	12	--	Op equip for anechoic equip
S-107	12	--	Acoustics lab
S-111	12	--	Applied Physics
S-121	12	--	Applied Physics
S-125	12	--	Comp/Sim lab
S-127	12	9	Applied Physics
S-135	12	4	Electro-optic
S-263	15	8	
S-301	20	--	MF Term
S-303	20	--	ECE VLSI
S-307	14	--	ADA lab
S-309	14	--	ADA lab
S-341	16	9	Graphics
S-419	15	3	ECE microwave
S-431	20	2	PC stations
S-543	N/A	N/A	ECE 15 radar
S-612	12	6	ECE radar
S-703	10	--	ECE microwave

Ingersoll

Room #	Capacity	Usage Hours	Purpose
I-158	6	2	Software Metrics
I-224	18	11	PC stations
I-250	18	16	PC stations
I-364E	13	4	Mainframe Term
I-374	1	8	Case Tool lab

Glasgow

Room #	Capacity	Usage Hours	Purpose
G-123	20	6	Mac lab
G-203	33	12	PC stations
G-318	22	24	UNIX stations

Halligan

Room #	Capacity	Usage Hours	Purpose
H-138	11	2	

BLDG 215

Room #	Capacity	Usage Hours	Purpose
N/A	N/A	8	Aero labs

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Naval Postgraduate School
Monterey, California 93943

14. Dr. Roland D. Kankey 1
AFIT/LAS
2950 P Street
WPAFB, Ohio 45433-7765

15. Lcdr Mark T. Timme 2
977 Leahy Road
Monterey, California 93940